

UNITED STATES AIR FORCE RESEARCH LABORATORY

JSF CAESAR: CONSTRUCTION OF A 3-D ANTHROPOMETRIC SAMPLE FOR DESIGN AND SIZING OF JOINT STRIKE FIGHTER PILOT CLOTHING AND PROTECTIVE EQUIPMENT

Jeffrey A. Hudson

ADVANCED INFORMATION ENGINEERING SERVICES, INC.
A GENERAL DYNAMICS COMPANY
5200 SPRINGFIELD PIKE, SUITE 200
DAYTON, OHIO 45431-1289

Gregory F. Zehner
Kathleen M. Robinette

HUMAN EFFECTIVENESS DIRECTORATE
CREW SYSTEM INTERFACE DIVISION
WRIGHT-PATTERSON AFB, OHIO 45433-7022

SEPTEMBER 2003

INTERIM REPORT FOR THE PERIOD FEBRUARY 2003 TO SEPTEMBER 2003

20040226 006

Approved for public release; distribution is unlimited.

Human Effectiveness Directorate
Crew System Interface Division
2255 H Street
Wright-Patterson AFB OH 45433-7022

STINFO COPY

NOTICES

When US Government drawings, specifications, or other data are used for any purpose other than a definitely related Government procurement operation, the Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Please do not request copies of this report from the Air Force Research Laboratory. Additional copies may be purchased from:

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Federal Government agencies and their contractors registered with the Defense Technical Information Center should direct requests for copies of this report to:

Defense Technical Information Center
8725 John J. Kingman Road, Suite 0944
Ft. Belvoir, Virginia 22060-6218

TECHNICAL REVIEW AND APPROVAL

AFRL-HE-WP-TR-2003-0142

This report has been reviewed by the Office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public.

The voluntary informed consent of the subjects used in this research was obtained as required by Air Force Instruction 40-402.

This technical report has been reviewed and is approved for publication.

FOR THE COMMANDER

//Signed//

MARIS M. VIKMANIS
Chief, Warfighter Interface Division
Air Force Research Laboratory

REPORT DOCUMENTATION PAGEForm Approved
OMB No. 074-0188

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MMM-YYYY) September 2003		2. REPORT TYPE Interim Report		3. DATES COVERED (From - To) February 2003 to September 2003	
4. TITLE AND SUBTITLE JSF CAESAR: Construction of a 3-D Anthropometric Sample for Design and Sizing of Joint Strike Fighter Pilot Clothing and Protective Equipment				5a. CONTRACT NUMBER F33615-02-C-6000	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER 62202F	
				5d. PROJECT NUMBER 7184	
6. AUTHOR(S) *Jeffrey A. Hudson **Gregory F. Zehner **Kathleen M. Robinette				5e. TASK NUMBER 08	
				5f. WORKUNIT NUMBER 70	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) *Advanced Information Engineering Systems, Inc. A General Dynamics Co. 5200 Springfield Pike, Suite 200 Dayton OH 45431				8. PERFORMING ORGANIZATION REPORT NUMBER Lockheed PO# 7073412	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) **Air Force Research Laboratory Human Effectiveness Directorate Crew System Interface Division Air Force Materiel Command Wright-Patterson AFB OH 45433-7022				10. SPONSOR / MONITOR'S ACRONYM AFRL-HE-WP-TR-2003-0142	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT The Joint Strike Fighter (JSF) anthropometric Cases 1 through 8 were not intended to represent a statistical description for the variation important in the design of personal clothing and equipment for the JSF pilot. Instead, the anthropometric measures associated with the JSF Cases define the minimum level of physical accommodation for men and women in the Joint Strike Fighter cockpit. The statistical process of constructing representative cases used in the design of clothing and gear require an entirely different multivariate approach. CAESAR, a 3-D whole body database, was sampled to produce 1374 subjects (651 men and 723 women) that represent a modern equivalent to the JPATS population, but using projected demographics of JSF flyers in the Joint Services in the year 2010. After analysis, and overlay of the JSF Cases, 646 men and 695 women were identified as falling within weight allowances and the reconstructed ellipses of accommodation defined by the original JSF Cases. The forty traditional measures and the associated 3-D scans of these individuals represent the statistical base from which JSF flight clothing and equipment can be designed and/or sized.					
15. SUBJECT TERMS JSF CAESAR Pilot Size Summary Statistics, JSF Pilot Flight Equipment, JSF Cases 1-8, JPATS Cases 1-7, Multivariate Analysis, Principal Components Analysis					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UNLIMITED	18. NUMBER OF PAGES 182	19a. NAME OF RESPONSIBLE PERSON: Gregory F. Zehner
a. REPORT UNCLAS	b. ABSTRACT UNCLAS	c. THIS PAGE UNCLAS			19b. TELEPHONE NUMBER (include area code) (937) 255-8812

THIS PAGE IS INTENTIONALLY LEFT BLANK

PREFACE

This research was conducted as part of the Cooperative Research and Design Agreement (CRADA) between General Dynamics AIES and the CARD Lab (AFRL/HECP). The work was commissioned and funded by Lockheed Martin (PO# 7073412) under the direction of Ken Waugh (JSF Pilot Flight and Survival Equipment IPT Lead). We appreciate all the support Ken has offered. We would also like to acknowledge the aid provided by Dr. Cate Harrison of the CARD Lab, as well as the efforts put forth by Scott Fleming, Mark Boehmer, Tina Brill, and Sherri Blackwell of General Dynamics AIES.

THIS PAGE IS INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

Introduction	1
Chapter 1: JSF CAESAR Sample Construction.....	3
Weight Selection.....	4
Age Selection	5
Race Weighting.....	5
Comparison of Racial Variation Effects on Anthropometry	5
Prediction of 2010 Joint Services Racial Proportions	12
Comparison to JSF 1-8: Validation for JSF CAESAR Sample	14
Discussion: Extrapolation of JSF Boundary Cases to non-cockpit accommodation applications.	17
Chapter 2: Comparison to The JPATS Population.....	20
Background on the Derivation of the JPATS Cases	20
JPATS Cases One and Seven.....	22
Comparison of Samples: JPATS vs. JSF CAESAR	25
Chapter 3: Foreign Flying Populations and JSF Accommodation.....	30
CAESAR Dutch Samples	32
Chapter 4: Visual Index.....	42
Chapter 5: JSF CAESAR Pilot-Size Sample - Summary Statistics	55
Appendix: Resource Listing – CARD Lab Fit-Mapping Studies	155
References	170
Index: Anthropometric Measures.....	172

LIST OF FIGURES

Figure 1-1: Flowchart for JSF CAESAR Sample Selection	3
Figure 1-2: Plot of Buttock-Knee Length by Group.	6
Figure 1-3: Plot of Sitting Height by Group.	6
Figure 1-4: Euro-American (race 1) and African-American (race 2) Body Proportions.	7
Figure 1-5: African-American (race2) and Hispanic-American (race 3) Body Proportions.....	8
Figure 1-6: African-American (race 2) and Asian-American (race 4) Body Proportions.	8
Figure 1-7: Asian-American (race 4) and Hispanic-American (race 3) Body Proportions.	9
Figure 1-8: Comparison of Hispanics to all Others for Sitting Height and Buttock-Knee Length.....	10
Figure 1-9: Comparison of Hispanics to all Others for Bideltoid Breadth and Hip Breadth.....	10
Figure 1-10: Comparison of Hispanics to all Others for Face Breadth and Head Circ.....	11
Figure 1-11: Comparison of Hispanics to all Others for Face Length and Nose Protrusion	11
Figure 1-12: Prediction of Female Racial Proportions in Joint Services for Year 2010.....	12
Figure 1-13: Prediction of Male Racial Proportions in Joint Services for Year 2010.	13
Figure 1-14: Principal Component Plot of JSF CAESAR women. Reconstructed accommodation ellipse through JSF Cases 1-8.....	15
Figure 1-15: Principal Component Plot of JSF CAESAR men. Reconstructed accommodation ellipse through JSF Cases 1-8.	16
Figure 1-16: Head Length vs. Head Breadth for JSF CAESAR Males and Females with Overlay of "Nearest Neighbor" JSF Cases.	18
Figure 1-17: Face Length vs. Bizygomatic Breadth for JSF CAESAR Males and Females with Overlay of "Nearest Neighbor" JSF Cases.	19
Figure 2-1: Effects of Body Sized Limits on Female Population.	21
Figure 2-2: Effects of Body Sized Limits on Male Population.....	22
Figure 2-3: JPATS Population with Cases 1-6.....	23
Figure 2-4: JPATS Population with Cases 1-7.....	23
Figure 2-5: Height/Weight Comparison for Males.	26
Figure 2-6: Height/Weight Comparison for Females.....	27
Figure 2-7: Chest Circumference and Waist Circumference Comparison for Males.	27
Figure 2-8: Shoulder Height and Thumb-Tip Reach Comparison for Females.....	28
Figure 2-9: Buttock-Knee and Knee Height Sitting Comparison for Males.....	28
Figure 2-10: Thigh Circumference and Hip Circumference Comparison for Females.....	29
Figure 3-1: Univariate Pilot Requirements for Canada, Australia, United Kingdom (broadest of combined services), and Norway.	31
Figure 3-2: Univariate Pilot Requirements for Canada, Australia, United Kingdom (broadest of combined services), Norway, The Netherlands, and Japan.....	32
Figure 3-3: Comparison of Dutch CAESAR Pilot Size Sample to JSF CAESAR Pilot Size.....	33
Figure 3-4: Head Breadth vs. Length for the Pilot Size Dutch and JSF CAESAR Pilot Size women.	34
Figure 3-5: Bizygomatic Breadth vs. Sellion to Supramenton Length for the Pilot Size Dutch women and JSF CAESAR Pilot Size women.	35
Figure 3-6: Head Breadth vs. Length for the Pilot Size Dutch men and JSF CAESAR men.....	36

Figure 3-7: Bizygomatic Breadth vs. Sellion to Supramenton Length for the Pilot Size Dutch men and JSF CAESAR men.....	37
Figure 3-8: Head Breadth vs. Length for the Pilot Size Dutch women and JSF CAESAR white women.	38
Figure 3-9: Bizygomatic Breadth vs. Sellion to Supramenton Length for the Pilot Size Dutch women and JSF CAESAR white women.....	39
Figure 3-10: Head Breadth vs. Length for the Pilot Size Dutch men and JSF CAESAR men....	40
Figure 3-11: Bizygomatic Breadth vs. Sellion to Supramenton Length for the Pilot Size Dutch men and JSF CAESAR white men.....	41

LIST OF TABLES

Table 1-1: Joint Services	4
Table 1-2: Weighting for Joint Services 2010 Race Proportion Predictions	14
Table 2-1: JSF Multivariate Cases	24
Table 2-2: Comparison of JSF and JPATS Female Samples	25
Table 3-1: Foreign Pilot Requirements	30

THIS PAGE IS INTENTIONALLY LEFT BLANK

INTRODUCTION

The anthropometric requirements for the Joint Strike Fighter (JSF) Program are represented by the JSF Cases 1 – 8. These anthropometric cases were originally derived during the Joint Primary Air Training System (JPATS) Program as a multivariate solution to describe variation in body size and proportion in an attempt to address concerns with *adequate vision*, *reach to controls*, and *obstruction clearance* specific to cockpit accommodation. The resulting JPATS Cases represented boundary conditions in the population which characterized *extreme* body size and proportion. They were selected from the results of separate multivariate analyses of men and women of the JPATS Population. (The origin of the JPATS Cases is noteworthy and its history, as described by their creator Dr. Greg Zehner, is included in Chapter 2.) Hence, the JSF Cases were never intended to represent a statistical description for the variation important in the design of personal clothing and equipment for the JSF pilot. In cockpit accommodation, it is assumed that if the extreme boundary Cases are accommodated so too are all members of the population that fall within the perimeter defined by the Cases, thus assuring a selected level of physical accommodation. This assumption is not necessarily true for design and sizing of personal flight apparel and equipment, where adequate representation in the central portion of the distribution is often the key to proper fit and sizing.

The statistical process of selecting representative cases for the design of clothing and personal equipment requires an entirely different multivariate approach. To support the JSF program, a modern USAF anthropometric database was used to construct a new statistical sample that will serve as a resource for the designers of JSF pilot clothing and equipment.

The Civilian American and European Surface Anthropometry Resource (CAESAR, Robinette et al. 1999, Robinette 2000, Harrison et al. 2002) is an international database of 3-D whole body scans combined with demographic data and 40 traditional anthropometric measurements. The North American portion of the Survey was sampled to produce 1374 subjects (651 men, 723 women), called the JSF CAESAR Sample that represents a modern equivalent to the JPATS population. This sampling was based on the desires and feedback from Ken Waugh and the JSF Life Support Working Group who wanted to represent the future flying population of the JSF as realistically as possible. This resulted in more realistic allowances for weight and age (with reservists in mind) as well as a projection of the demographics of JSF flyers in the US Joint Services to the year 2010. After a subsequent multivariate analysis, and overlay of the JSF Cases, the JSF CAESAR Sample was reduced to 646 men and 695 women who were identified as falling *within* the reconstructed ellipses of accommodation defined by the original JSF Cases 1-8 as well as within the weight limit of 103 - 245 pounds. These individuals constitute the JSF CAESAR *Pilot-Size* Sample, and all of them should be considered physically accommodated in the JSF. Hence, if JSF apparel or equipment is designed to accommodate 100% of all potential JSF pilots, they would need to design to fit all 646 men and 695 women in this sample. This sampling procedure is reported in Chapter 1 and the summary statistics for 99 anthropometric measures (40 traditional, 59 scan extracted) of the JSF CAESAR Pilot-Sized Sample are reported in Chapter 5.

The possible export of the JSF to other countries, characterized by anthropometry in their flying populations that sharply differ from that in the US, is an issue that needs to be addressed. Ideally, in the near future, anthropometric databases for each country's general population will be obtained and analyzed in detail – both for differences in physical accommodation in the cockpit as well as for size and shape variation relevant to apparel and gear. For the publication of this report, we have included (in Chapter 3) comparisons of country-specific current pilot requirements to the JSF CAESAR Sample for the following countries: United Kingdom, Canada, Australia, Norway, and Japan. Italy and The Netherlands were chosen for the CAESAR Survey, in conjunction with the US, to characterize NATO countries in general. The Netherlands has the tallest population in NATO and Italy is among the shortest. The Dutch portion of the CAESAR Survey was used to generate a Dutch *Current Pilot-Sized Sample*. The Dutch summary statistics are included electronically on the accompanying USB drive. We were not able to acquire the Italian current pilot requirements in time to produce a comparable Italian *Current Pilot-Sized Sample*. However, we are including the data from the entire Italian CAESAR Survey, as well as the Dutch CAESAR Survey, in the deliverable. Hence, if future samples are derived for Italy, or refined for the Netherlands, users will only need to be sent an updated Excel file, and not new sets of whole body scan files. The following deliverables are located on the accompanying USB Drive:

1. JSF CAESAR (US) Sample
 - a) Excel file with JSF US Joint Services (N=1374) and “flagged” JSF Pilot Size Subjects (N=1354). File contains demographics, 40 traditional measures, and 59 scan-extracted measures. The race-weighted Covariance and Correlation of all 99 variables for the JSF CAESAR Pilot Size Sample are also included in this excel file.
 - b) Compressed Whole Body Scan Files (2 seated, 1 standing) labeled by Subject Number (N=1374).
2. CAESAR Netherlands
 - a) Excel file with ALL 1267 subjects from the CAESAR Survey in the Netherlands. File contains demographics, 40 traditional measures, and 59 scan-extracted measurements. Subjects that are considered Current Dutch Pilot Size are flagged: Male=332, Female=461.
 - b) Compressed Whole Body Scan Files (2 seated, 1 standing) labeled by Subject Number (N=1267).
3. CAESAR Italy
 - a) Excel file with ALL 801 subjects from the CAESAR Survey in Italy.
 - b) Compressed Whole Body Scan Files (2 seated, 1 standing) labeled by Subject Number (N=801).
4. FINAL REPORT - JSF CAESAR: A Word document – “Construction of a 3-D Anthropometric Sample for Design and Sizing of Joint Strike Fighter Pilot Clothing and Protective Equipment.” This is the electronic copy of this final report.
5. INTEGRATE Installation Files: 3-D scan visualization and analysis tool.

CHAPTER 1: JSF CAESAR SAMPLE CONSTRUCTION

This chapter details the process of selecting and weighting the subjects that produced the JSF CAESAR Sample (651 males, 723 females) from the North American CAESAR Survey (1119 males, 1261 females). To validate the JSF CAESAR Sample for the specified levels of cockpit accommodation intended by the original JSF Cases, a multivariate analysis was run to replicate what was done for JPATS. The resulting multivariate distribution was then compared to overlays of the JSF Cases 1-8. Accommodation ellipses for both sexes were reconstructed through the plots of the original JSF Cases in this JSF CAESAR multivariate space. This allowed exact definition of the JSF CAESAR *Pilot-Size* Sample by marking subjects as inside (accommodated) or outside (dis-accommodated) of their respective ellipses. This resulted in 646 males and 695 females that comprise the JSF CAESAR Pilot-Size Sample. Chapter 5 reports the summary statistics on 99 anthropometric measures for this sample, while their covariance and correlation structure are reported electronically on the accompanying USB drive.

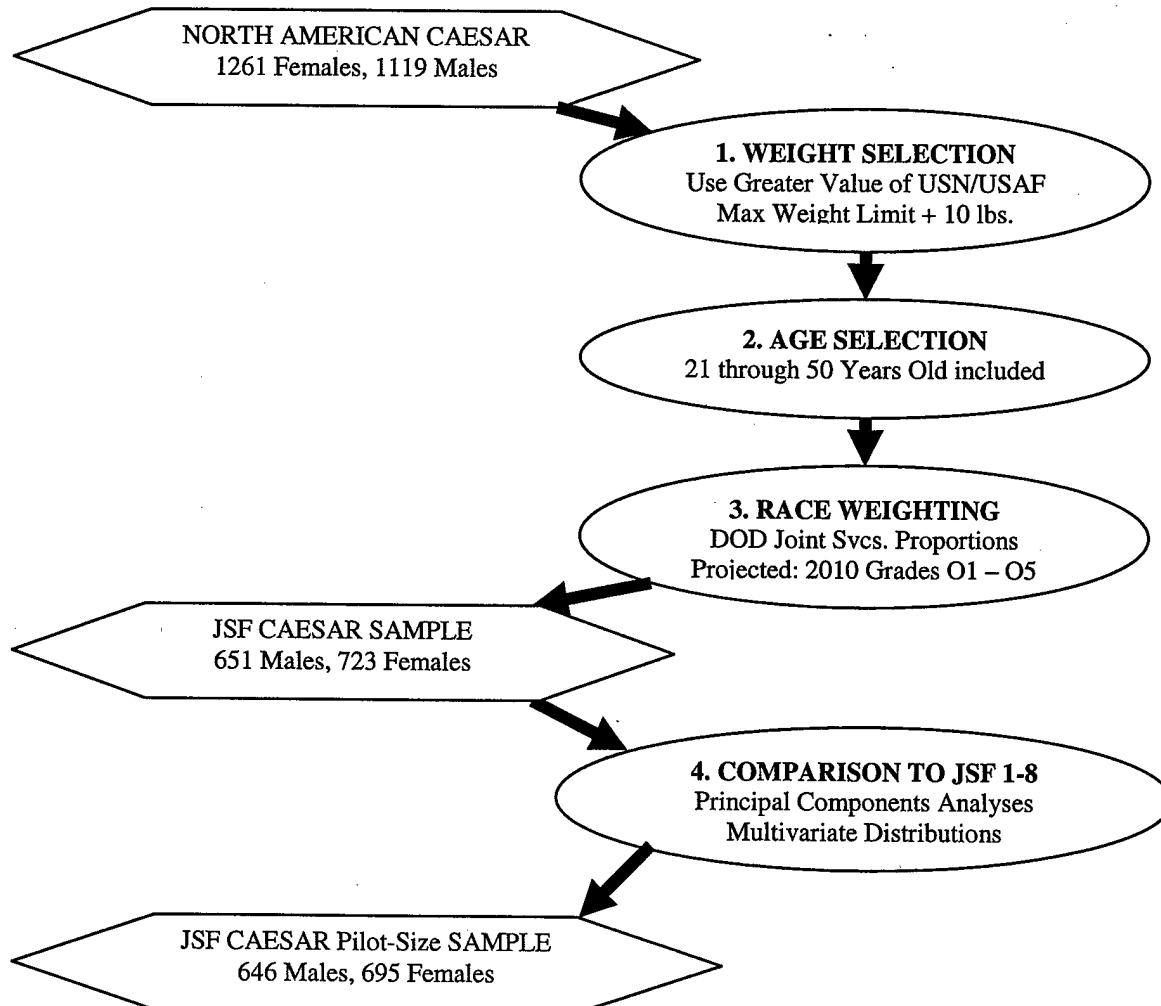


Figure 1-1: Flowchart for JSF CAESAR Sample Selection

In Figure 1-1, above, a flow chart has been drawn to illustrate the sequence of discussion for the JSF CAESAR Sample generation and validation.

Weight Selection

With the approval of the JSF Life Support Working Group it was decided to use a compilation of the Height-Weight Requirements in place by both the US Navy (OPNAVINST 6110.1G) and the US Air Force (AFI 48-123). The greater of the two maximum values, given a stature, was used. Below in Table 1-1, it can be seen that the USAF is more liberal with maximum weights for men, and the USN (save for a 58" Stature) is more liberal in weight maximums for the women. All subjects in North American CAESAR were screened on these tabled values and assigned a HT/WT Code as well as calculating their overweight value. Subjects were allowed to pass through the WEIGHT screening filter if they were within tabled limits or less than or equal to 10 lbs overweight given their stature. No minimum weights were used.

Table 1-1: Joint Services			
Maximum of upper Weight Limits Given Stature			
	Max WT	Max WT	HT/WT
Stature (in.)	Male (lbs.)	Female (lbs.)	Code*
58	149	132	1
59	151	136	2
60	153	141	3
61	155	145	4
62	158	149	5
63	160	152	6
64	162	156	7
65	165	160	8
66	171	163	9
67	179	167	10
68	184	170	11
69	189	174	12
70	194	177	13
71	199	181	14
72	206	185	15
73	211	189	16
74	218	194	17
75	224	200	18
76	230	205	19
77	236	211	20
78	242	216	21
79	246	222	22
80	254	227	23
USAF - Bug Fill		USN - No Fill	
*Code 0 assigned to those outside ranges.			

Age Selection

All subjects who fell between 21 and 50 years of age, inclusively, passed through the AGE filter. This age range takes into consideration the large number of active reservists that remain flying well into middle age.

Race Weighting

After examining the Department of Defense (DoD) data on racial makeup from 1992 to 2002 in the Joint Services it was decided to consider only the major race categories for inclusion: European American, African American, Asian American, and Hispanic American. Upon further analysis it became evident that the distinct body size and shape variation that characterize the first three races was not evident in the Hispanics. Hence, the discussion below supports the assertion that Hispanic variation is included and described by the other races and is therefore not needed as a distinct category for an application based on unique shape and size variation in racial populations.

Comparison of Racial Variation Effects on Anthropometry

The effect of racial/ethnic background on anthropometric dimensions is well documented (Krogman and Iscan, 1986; Trotter and Gleser, 1952; Giles and Elliot, 1962). Significant differences between racial/ethnic groups exist in many anthropometric dimensions as a result of climatic adaptations. The interest here is in how these differences affect the design of equipment that must closely fit the human body and the way an individual fits into a cockpit. Samples of 100 females and 200 males from four ethnic categories were selected from the U.S. Army data pool (Gordon 1989) for comparison. The racial/ethnic categories discussed here were established by interview during the 1988 Army survey. Four major groups are compared: European American (1), African American (2), Hispanic American (3), and Asian American (4). These categories were established by self-identification and interview during the 1988 US Army Anthropometric Survey. They are used for consistency and refer to American populations descended from specific geographic areas.

In Figures 1-2 and 1-3, below, Box and Whisker plots were used to demonstrate univariate differences between these groups. ANOVA and t-tests showed highly significant differences between these groups (except for Sitting Height where there is little difference between group 2 and group 3).

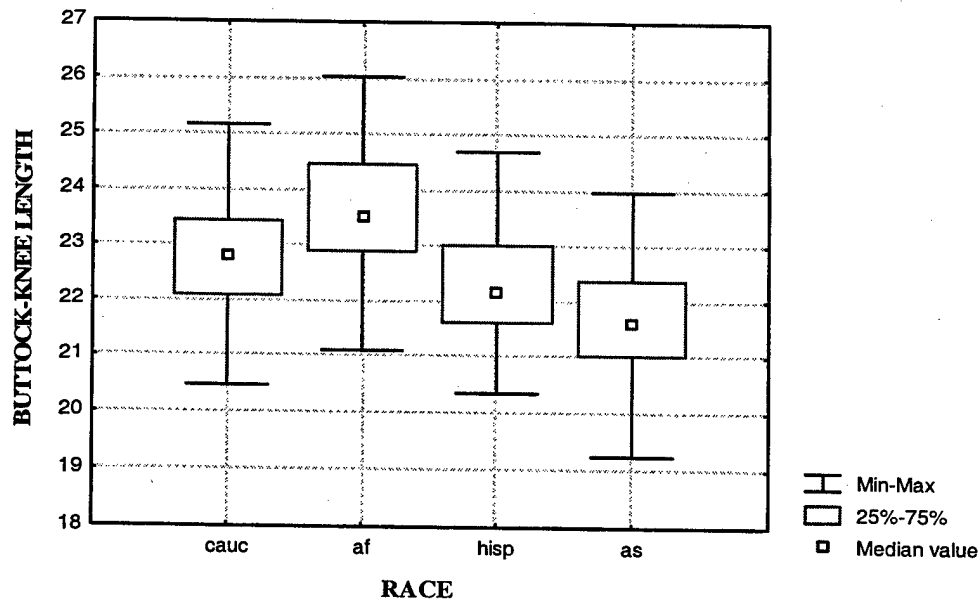


Figure 1-2: Plot of Buttock-Knee Length by Group.

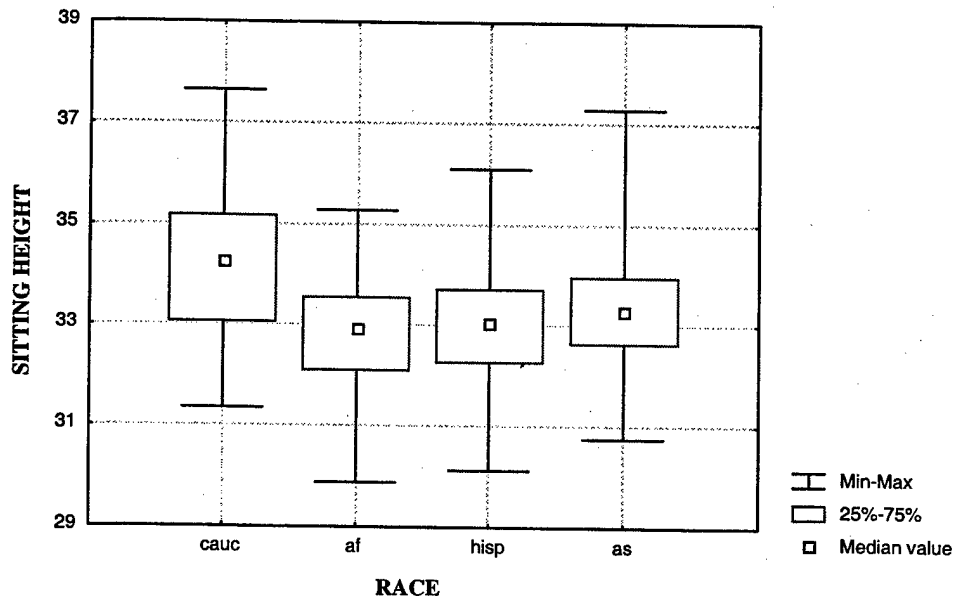


Figure 1-3: Plot of Sitting Height by Group.

Differences in the limb and torso lengths in the extremes of these groups are immediately apparent. Simply expanding the analysis to two-dimensional space is enlightening (Figure 1-4). Allen's Rule (Roberts 1978) describes changes in the torso/limb proportions of a population relative to their proximity to equatorial regions. Climatic adaptations such as large torso sizes with large amounts of subcutaneous fat improve tolerance to the cold. Also, the relative amount

of exposed surface area is used as an explanation of differences in torso/limb proportions. These differences are also observed in the groups discussed here. The European American (large Sitting Height, short Buttock-Knee length) and African American (short Sitting Height, long Buttock-Knee length) samples show the predicted patterns of body proportions.

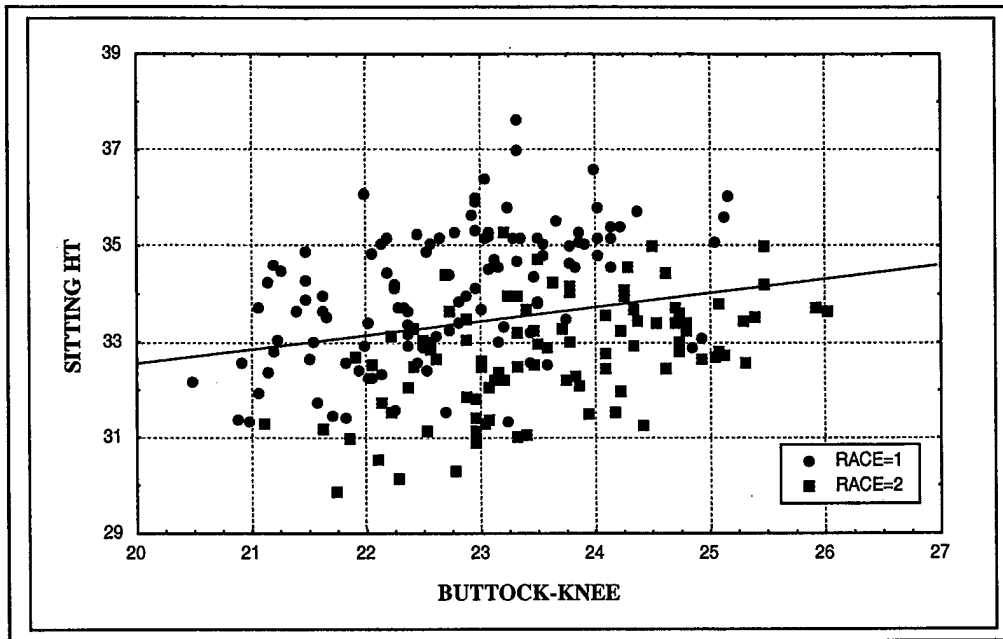


Figure 1-4: Euro-American (race 1) and African-American (race 2) Body Proportions.

Group 2 shows an interesting contrast in these two measurements. On the mean, African-Americans exhibit the largest Buttock-Knee lengths of the four groups and the smallest Sitting Heights. This pattern confirms Allen's rule when compared to Group 1 (European-Americans). Group 1 also appears to confirm Allen's rule (in reverse). The Hispanic-American and Asian-American classifications combine people from wide geographical areas (Asian includes the Pacific Islands to far northern populations), and recent emergence (Hispanics as a group have only been recognized a few hundred years). The results for these groups are inconclusive. The plots on the following page compare the other groups to Group 2.

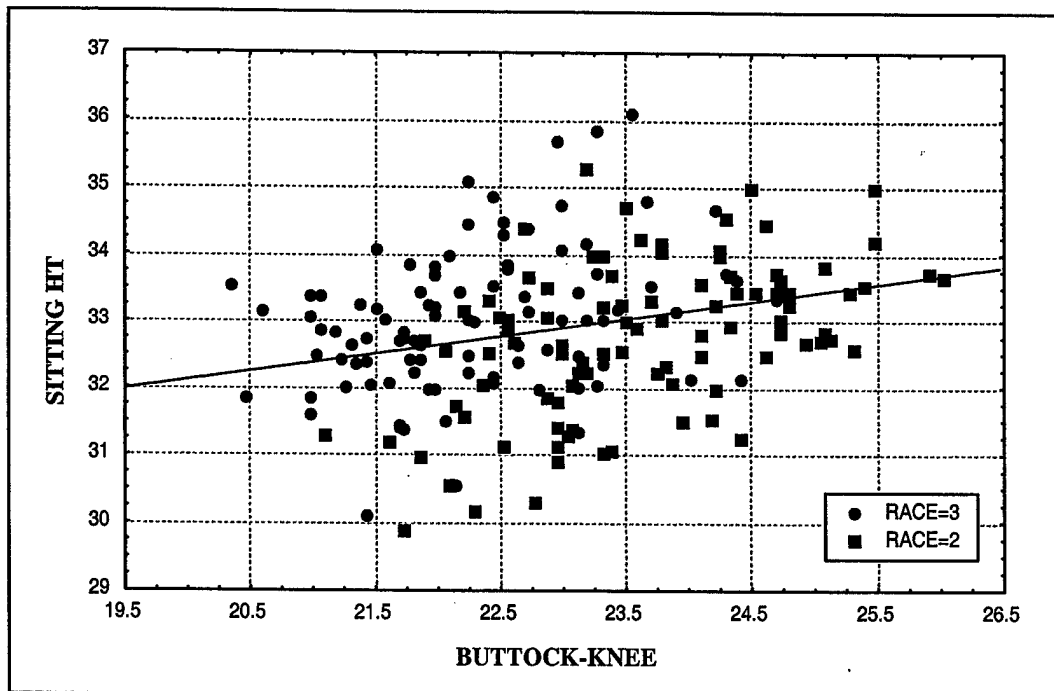


Figure 1-5: African-American (race2) and Hispanic-American (race 3) Body Proportions.

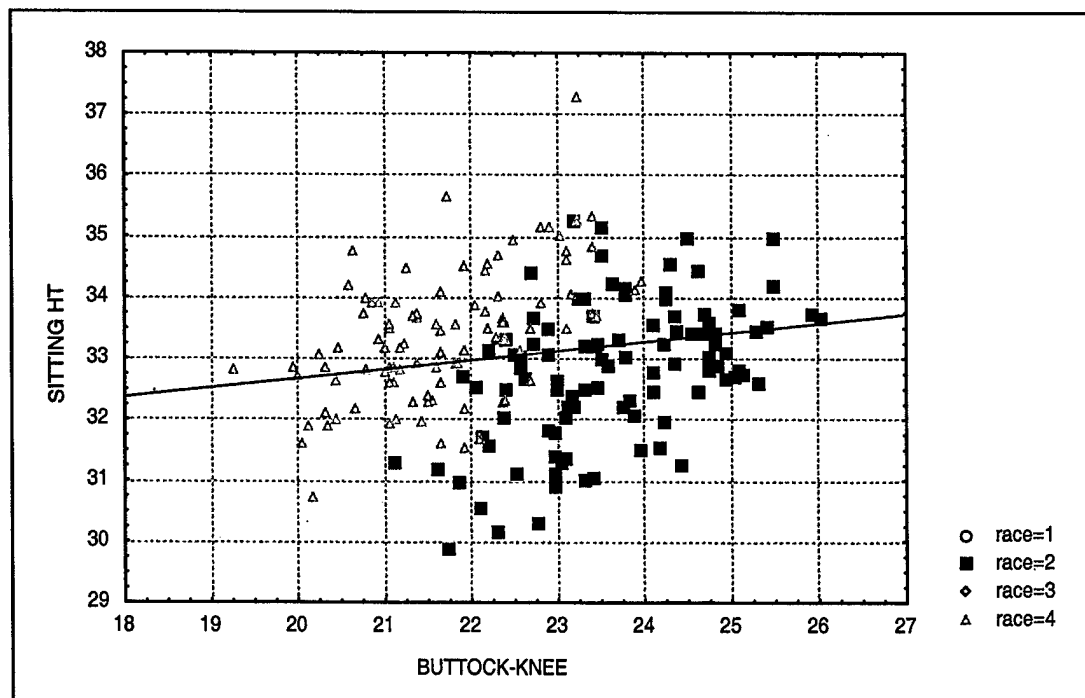


Figure 1-6: African-American (race 2) and Asian-American (race 4) Body Proportions.

The bivariate plot in Figure 1-7 compares Hispanic Americans and Asian Americans.

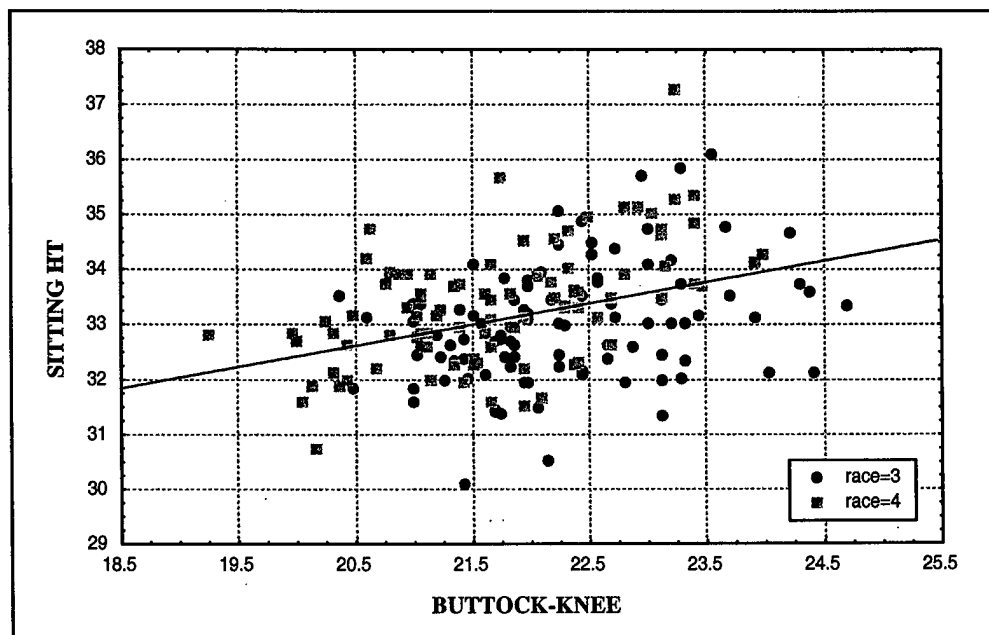


Figure 1-7: Asian-American (race 4) and Hispanic-American (race 3) Body Proportions.

The trend in torso height differences from African-Americans appears to exist in Hispanic-American and Asian-American groups to a lesser extent than the European-American and African-American samples. The limbs appear only slightly different as well. While the differences in these four groups are real, and significant, in all variables analyzed, the Hispanic-American group is completely encompassed by the other ethnic groups. The following figures highlight the distribution of Hispanic-Americans when compared to the other three groups on several different measurements.

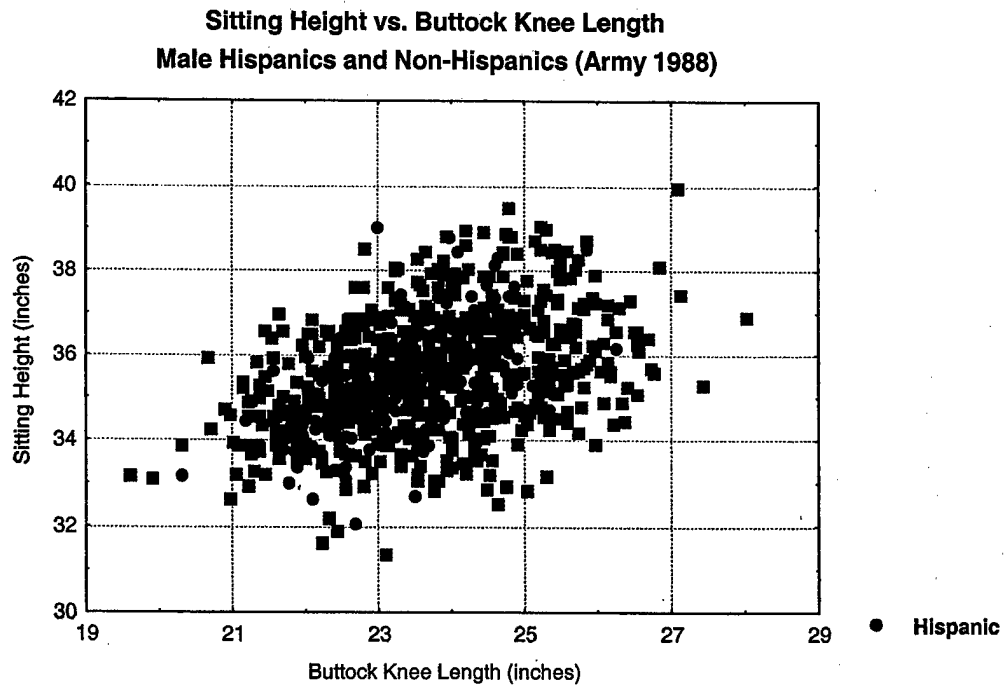


Figure 1-8: Comparison of Hispanics to all Others for Sitting Height and Buttock-Knee Length

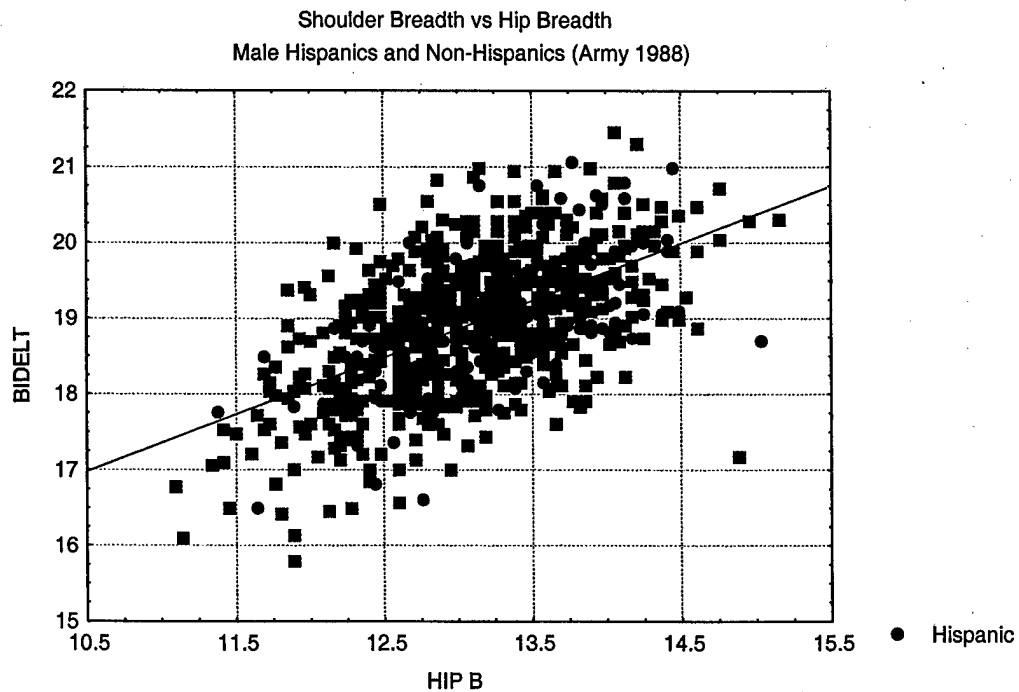


Figure 1-9: Comparison of Hispanics to all Others for Bideloid Breadth and Hip Breadth

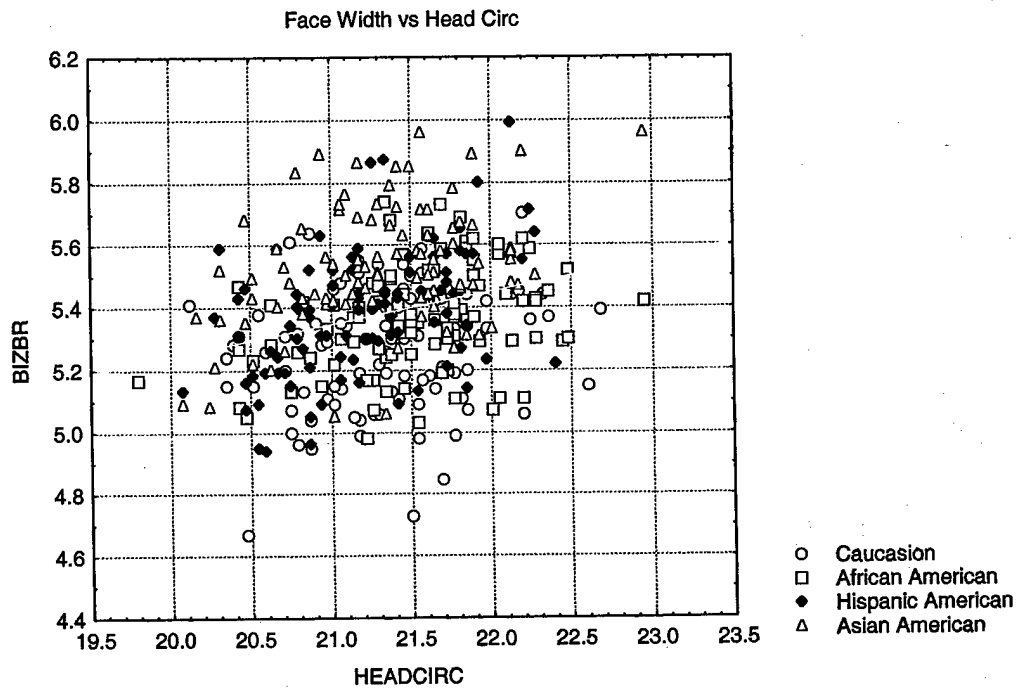


Figure 1-10: Comparison of Hispanics to all Others for Face Breadth and Head Circ

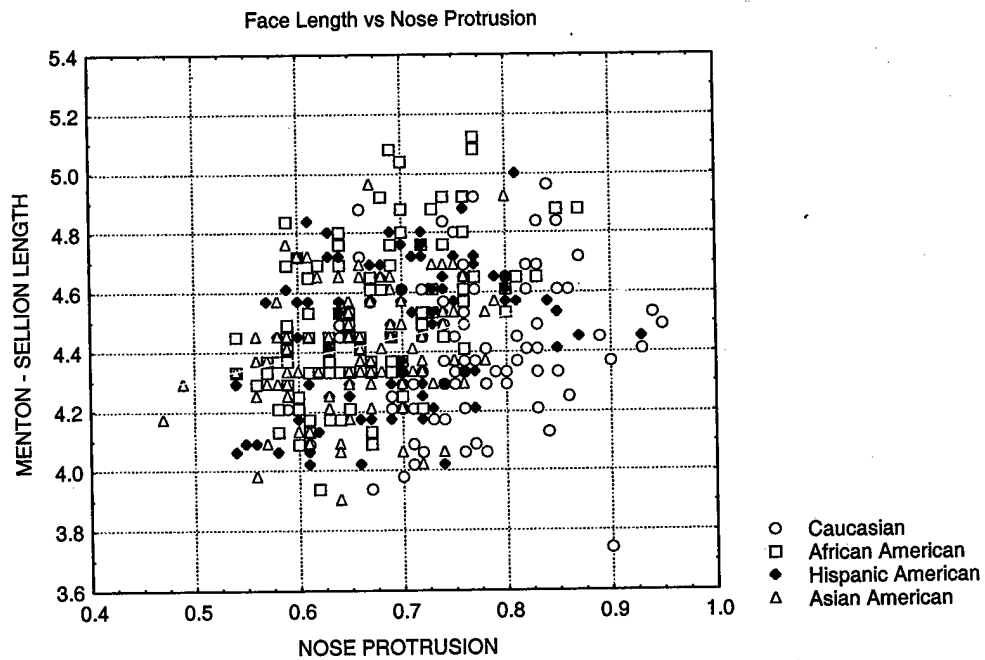


Figure 1-11: Comparison of Hispanics to all Others for Face Length and Nose Protrusion

This distribution was apparent for all variables analyzed. The Hispanic group is a mix of many “racial” types, and as expected, demonstrates a mix of anthropometric proportions that are exhibited to a higher degree by the three other groups described here. For that reason it is not necessary to include them in the JSF sample as a distinct group in themselves. Instead of removing the Hispanics in the Sample they were included with European Americans.

Prediction of 2010 Joint Services Racial Proportions

In Figure 1-12, below, ten years of data from the DoD on racial proportions for women in the Joint Services (Grade level O1 – O5) is plotted. The same is plotted for men in Figure 1-13. Linear regression was used to predict the Joint Service racial proportions for the year 2010.

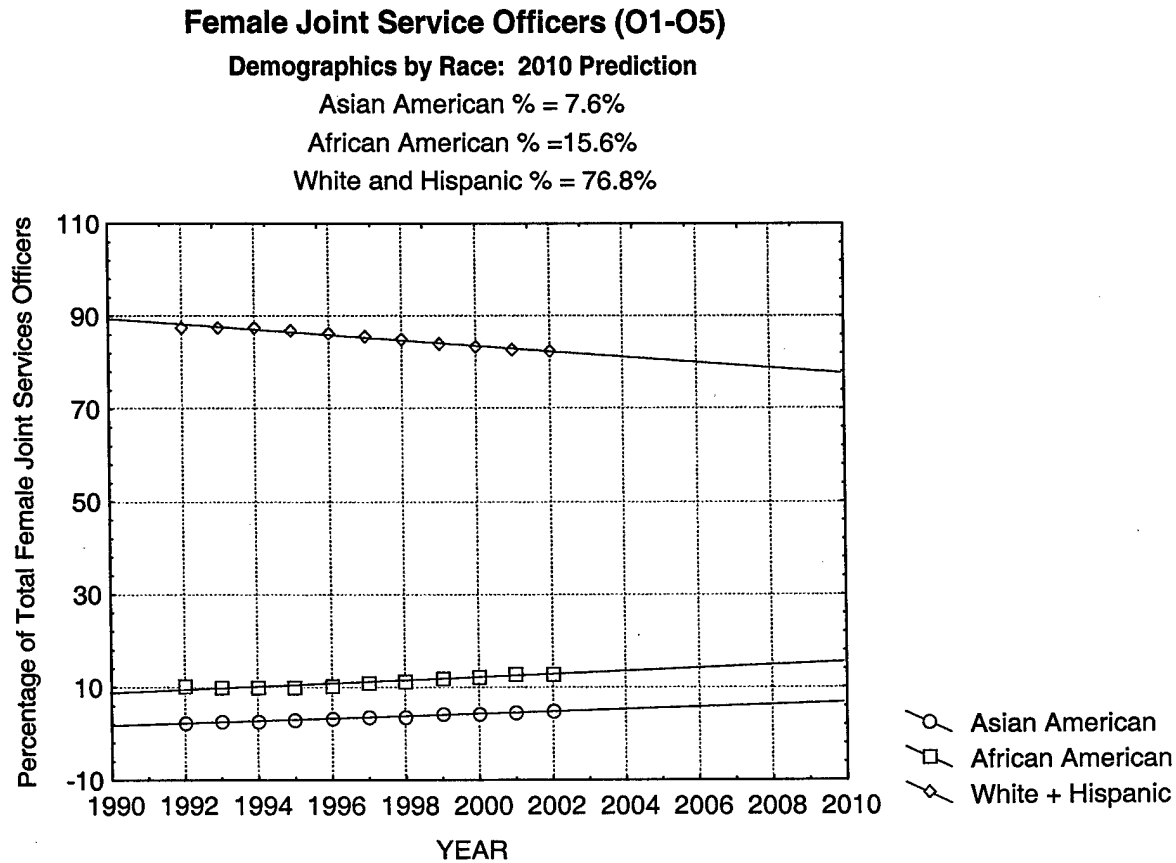


Figure 1-12: Prediction of Female Racial Proportions in Joint Services for Year 2010.

Male Joint Service Officers (O1-O5)

Demographics by Race: 2010 Prediction

Asian American % = 4.2%

African American % = 6.6%

White + Hispanic % = 89.1%

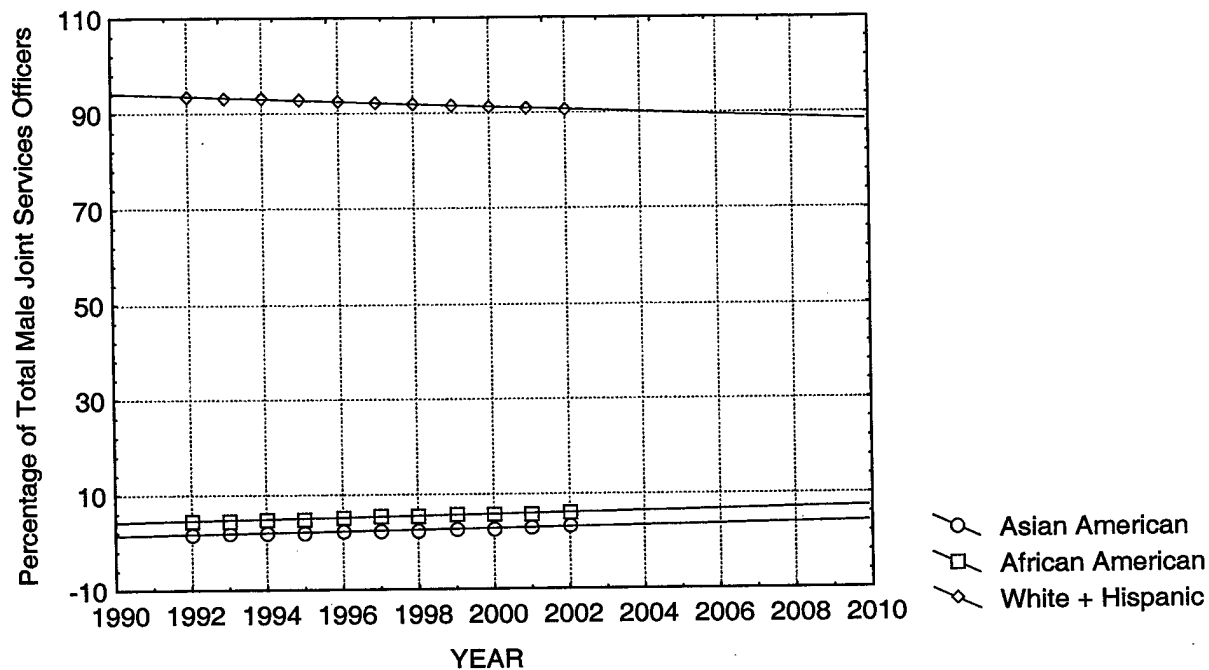


Figure 1-13: Prediction of Male Racial Proportions in Joint Services for Year 2010.

The 2010 predicted racial proportions were then used to statistically “weight” the data for both males and females. In this case, the weighting simply assigns a bias upward for the sample’s underrepresented races in 2010, and bias downward for overrepresented races. Weighting allows all of the subjects to be used in the sample and not eliminated to force the 2010 proportion.

Table 1-2: Weighting for Joint Services 2010 Race Proportion Predictions			
Males N=651			
	<u>JSF CAESAR Proportions</u>	<u>2010 Jt Svc Pred.</u>	<u>Assigned Weight</u>
White (517) + Hispanic (19)	0.8233	0.891	1.08
African American (58)	0.0891	0.066	0.74
Asian American (57)	0.0876	0.042	0.48
Females N=723			
	<u>JSF CAESAR Proportions</u>	<u>2010 Jt Svc Pred.</u>	<u>Assigned Weight</u>
White (578) + Hispanic (10)	0.8133	0.768	0.94
African American (68)	0.0941	0.156	1.66
Asian American (67)	0.0927	0.076	0.82

Comparison to JSF 1-8: Validation for JSF CAESAR Sample

The resulting JSF CAESAR Sample is equivalent to the *JPATS population* which was used in the original multivariate analysis that initiated the definition of the JPATS Cases (see Chapter 2 for history of JPATS Cases). An analytical comparison to the eight JSF Cases was required to determine the validity of the JSF CAESAR Sample and ensure its appropriate use as the needed pilot-gear “augmentation” sample to the current cockpit accommodation Cases (JSF 1-8).

A Principal Components Analysis (PCA) was run on the JSF CAESAR Sample – men and women separately – to replicate the original step in the JPATS analysis. In simple terms, the PCA is a multivariate analysis that finds and simplifies the simultaneous variation in a large set of variables. In this analysis, a very large portion of the variation present in the seated “cockpit accommodation” variables (Buttock Knee Length, Knee Height, Sitting Height, Thumb Tip Reach, Sitting Eye Height, Shoulder Height) was simplified and explained by two new variables, called Principal Components (PCs). On the first component, or axis, all 6 variables increase or decrease together, hence we name this component “size”, thus PC 1 is responsible for describing the greatest type of variation in the sample. In the positive direction of PC 2 the limb dimensions increase while the torso dimensions decrease. In the negative direction on PC 2, the reverse is true. Thus, PC 2 describes the second most important trait in variation – a contrast in limb length and torso height. In the original JPATS analysis these two components described almost 90% of the variation in the 6 variables.

Below in Figures 1-14 and 1-15, the women and men, respectively, of the JSF CAESAR Sample have been plotted according to their scores on Principal Components 1 and 2. (These are standardized scores with a mean of 0 and a Standard Deviation of 1 on each PC). The JSF Cases 1-8 are overlaid on these plots after their scores on the axes were calculated (with the JSF CAESAR multivariate solution equations) using their specified anthropometry.

The original JPATS Cases were selected to represent the boundary ellipses that contain the desired accommodation percentage within their perimeter. The final JPATS Cases were an aggregate of the original mathematically selected cases (biggest cases from male ellipses, smallest cases from female ellipses) as well as some politically driven addition, deletion, and modification to the Cases (again, see Chapter 2). The resulting accommodation percentages afforded by the JPATS Cases were ~99% for males and ~97.5% for females. On the graphs

below, accommodation ellipses have been reconstructed using the actual plotting of JSF Cases 1 through 8. Remarkably, the resulting accommodation percentages for both sexes of the JSF CAESAR samples are comparable: Males 99.2%, and Females 97.9%. This means that the JSF CAESAR Sample more than adequately represents the physical variation of those that the JSF cockpit is designed to accommodate. (Non-cockpit variable comparisons are made in Chapter 2.) In the accompanying Excel spreadsheet (JSF CAESAR (US) Sample) there is a variable "JSFPILOT" which indicates, with a value of 1.0, the subjects that were included in these defined JSF ellipses of accommodation. Of the 723 females, 708 of them are physically accommodated in the JSF; however, 13 were below the 103 lb. JSF ejection seat weight minimum and were removed, leaving 695 total Pilot Size women. For the 651 males, 646 are considered accommodated. Two of the males fell outside the reconstructed ellipse but were retained as Pilot Size based on their proximity to JSF Case 8.

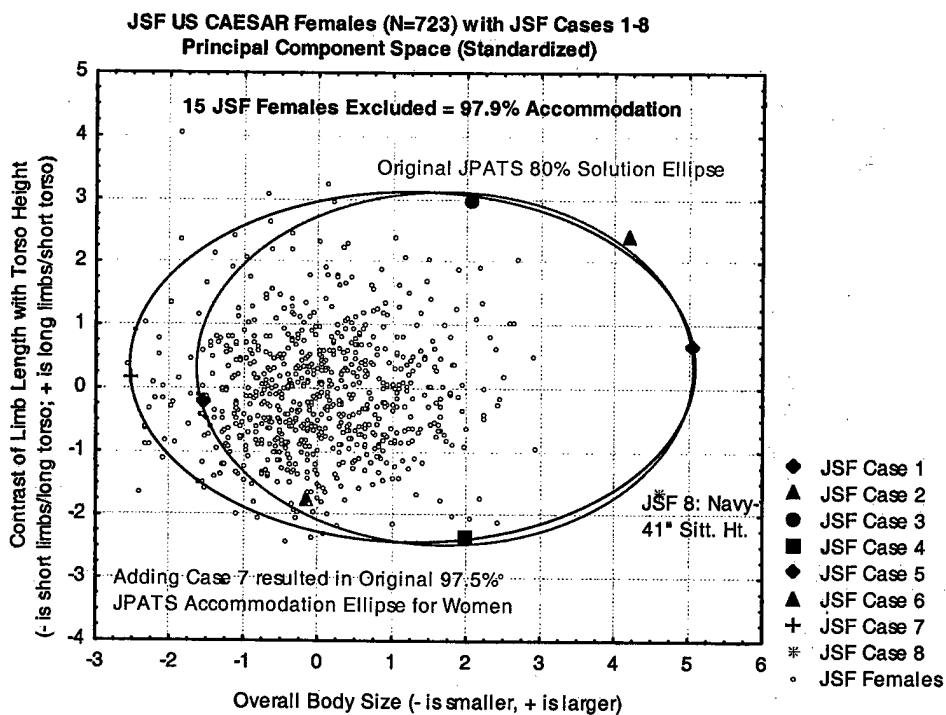


Figure 1-14: Principal Component Plot of JSF CAESAR women. Reconstructed accommodation ellipse through JSF Cases 1-8.

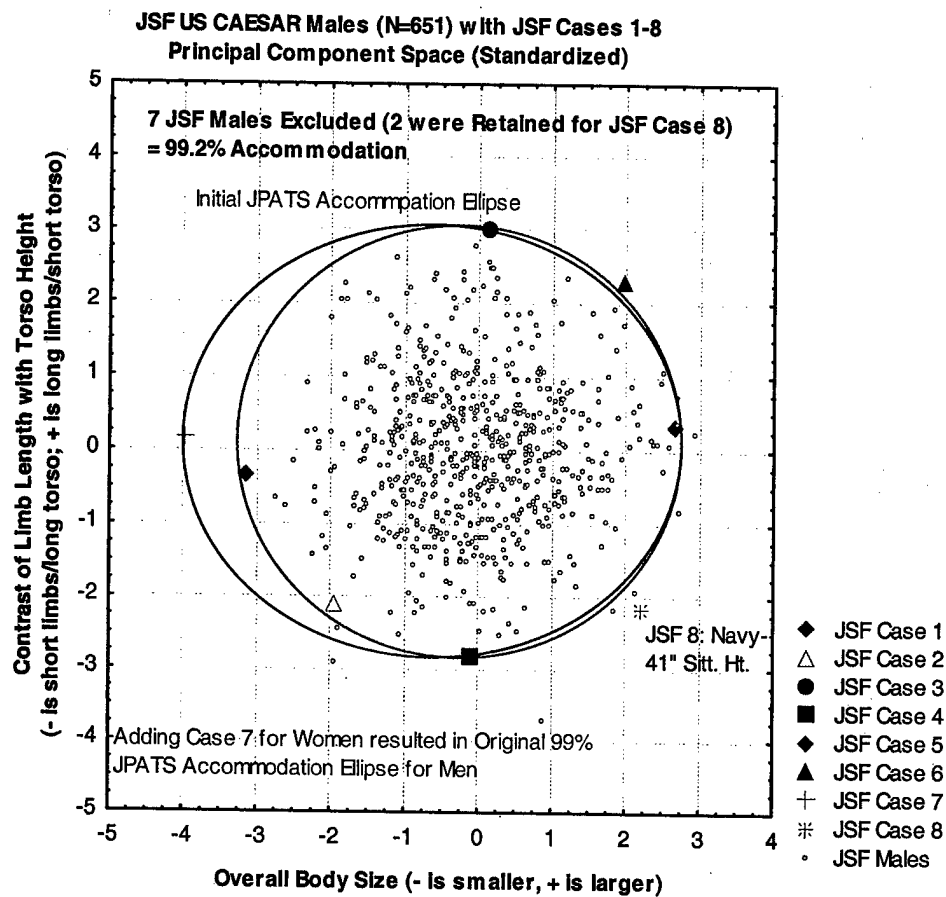


Figure 1-15: Principal Component Plot of JSF CAESAR men. Reconstructed accommodation ellipse through JSF Cases 1-8.

Discussion: Extrapolation of JSF Boundary Cases to non-cockpit accommodation applications.

The JSF Cases represent boundary conditions for overall size and limb proportion. They are extreme examples of the distribution generated with the multivariate cockpit accommodation solution. In the past there have been requests to calculate a variable value (Head Breadth for example) for JPATS Case 7, or for any other JSF Case. It must be understood that although the JPATS Case specifications are used to derive a particular variable value, that value may not necessarily represent an extreme boundary condition for this new measure of interest. We are often presented with design or modification issues that require additional values (means, maximums, minimums etc.) to characterize anthropometric dimensions that are not part of the original JSF Case specification. If a needed dimension is highly correlated with one or more of the cockpit variables (e.g. Thumb Tip Reach, Buttock Knee Length, Knee Height Sitting, etc.) then additional anthropometric values for the JSF Cases may be usefully assigned. The value ranges for Shoulder Breadth and Chest Depth in the JSF specification are good examples. However, this will not be true of all dimensions. To illustrate, Figure 1-16, below, plots Head Breadth against Head Length for the men and women of the JSF CAESAR Pilot Size Sample. Subjects, selected as "Nearest Neighbors" to the JSF Cases in the original Principal Component Space (Figures 1-14 and 1-15), were identified and marked on the plots below. It is easily observed that the Nearest Neighbor Subjects are positioned throughout the distribution and are not defining a boundary perimeter as they do in Principal Component Space. In fact, none of the groups of Nearest Neighbor Subjects cluster as they did around their respective JSF Cases in Principal Component Space. Figure 1-17, below, illustrates the same Nearest Neighbor Subjects on a plot of Face Length and Bizygomatic Breadth. The same is true for these face dimensions, thus demonstrating that subjects with extreme overall size and/or limb proportion do not necessarily have extreme facial proportions.

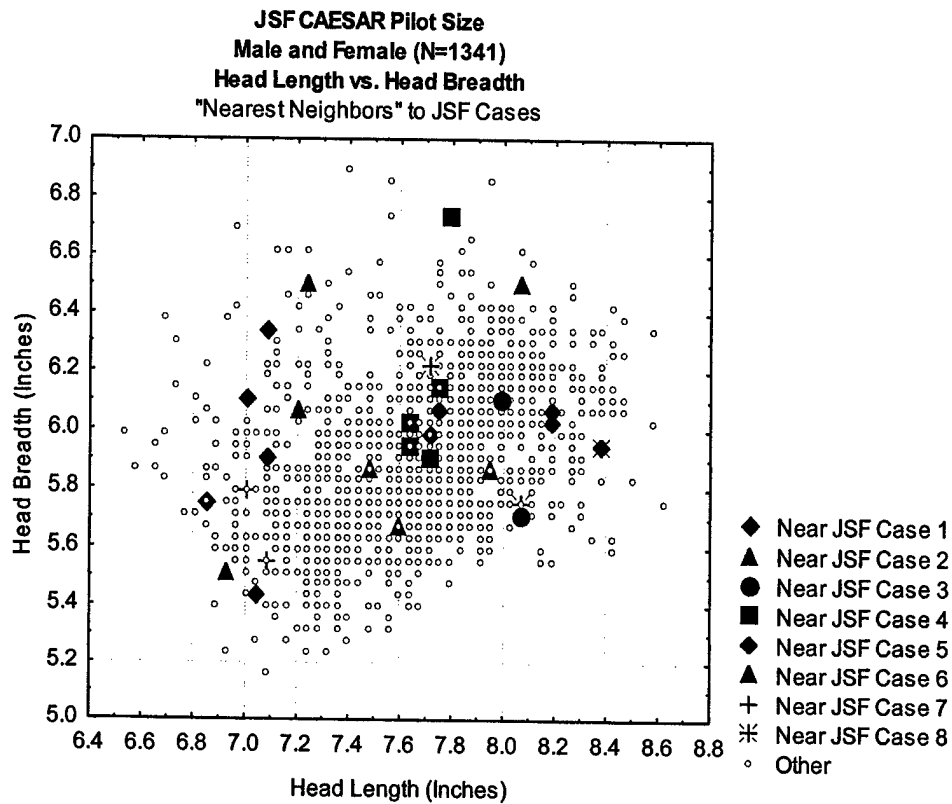


Figure 1-16: Head Length vs. Head Breadth for JSF CAESAR Males and Females with Overlay of "Nearest Neighbor" JSF Cases.

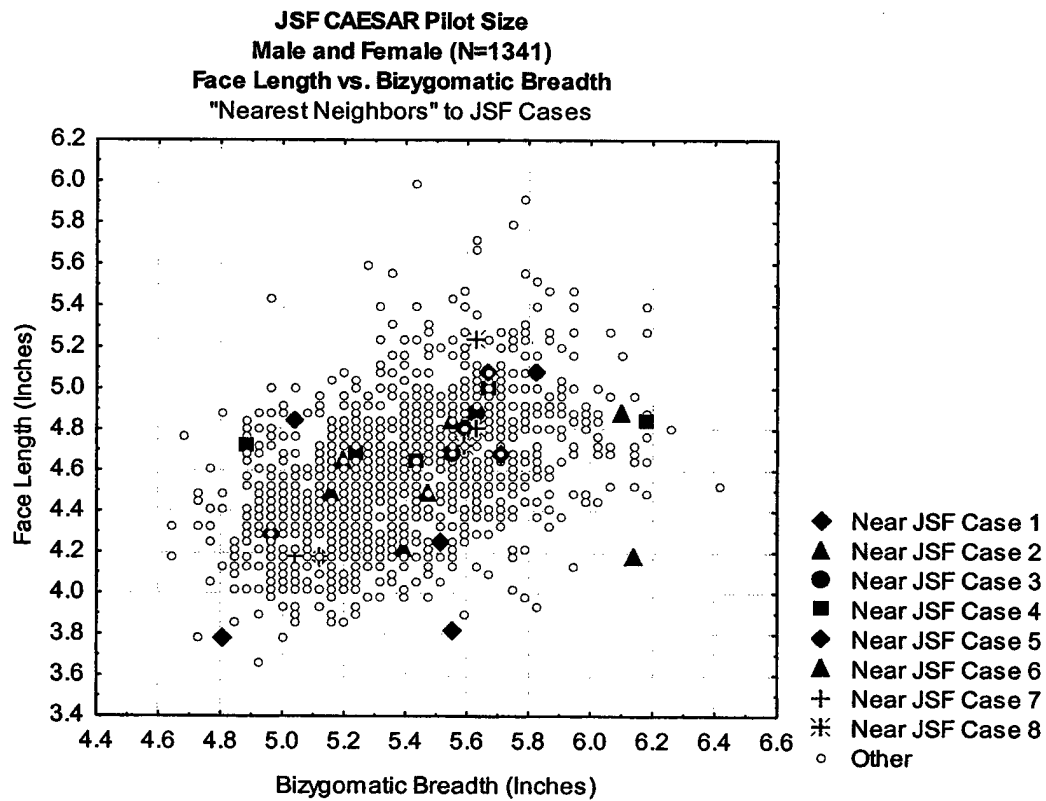


Figure 1-17: Face Length vs. Bizygomatic Breadth for JSF CAESAR Males and Females with Overlay of "Nearest Neighbor" JSF Cases.

CHAPTER 2: COMPARISON TO THE JPATS POPULATION

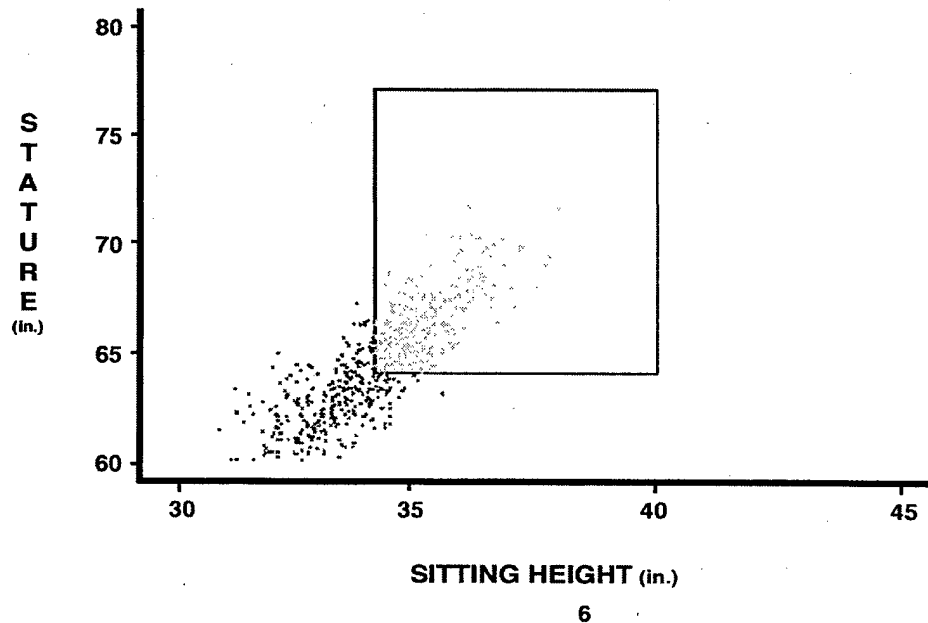
Background on the Derivation of the JPATS Cases

Originally, the JPATS aircraft was to be designed to accommodate "All Current Pilots". In other words, those individuals meeting US Air Force and Navy body size entrance requirements for flight training. A multivariate approach was used to define eight cases representing all the size variability existing in the flying population. However, due to Congressional desire to expand the assignment of women in the military, a DoD working group was convened in the summer of 1993 to examine the anthropometric specifications which were being considered for the JPATS program. This working group attempted to determine the effects of the original JPATS specifications on accommodation of women in the cockpit.

One of the first tasks of the working group was to identify an appropriate anthropometric database that could be used by all involved, so that all anthropometric calculations would be comparable. The decision was made to use the 1988 US Army Anthropometric Survey (Gordon, et. al. 1989), and cull from it a sample which represented those females with the potential to become pilots if the anthropometric restrictions to enter flight training were not in place. The sample was based on the following criteria.

1. Age must be greater than 22 years since pilots in the USAF and USN must be college graduates. (This also assured that nearly all subjects had achieved their full adult body size.)
2. Racial mix was constructed to match the US college-graduate population in 1992 - approximately 86% White, 6% Black, 4% Hispanic, and 4% Asian. These data were retrieved from the US Department of Education.
3. Height and Weight tables for the USAF and USN were used to screen all potential subjects to assure they were within appropriate limits.

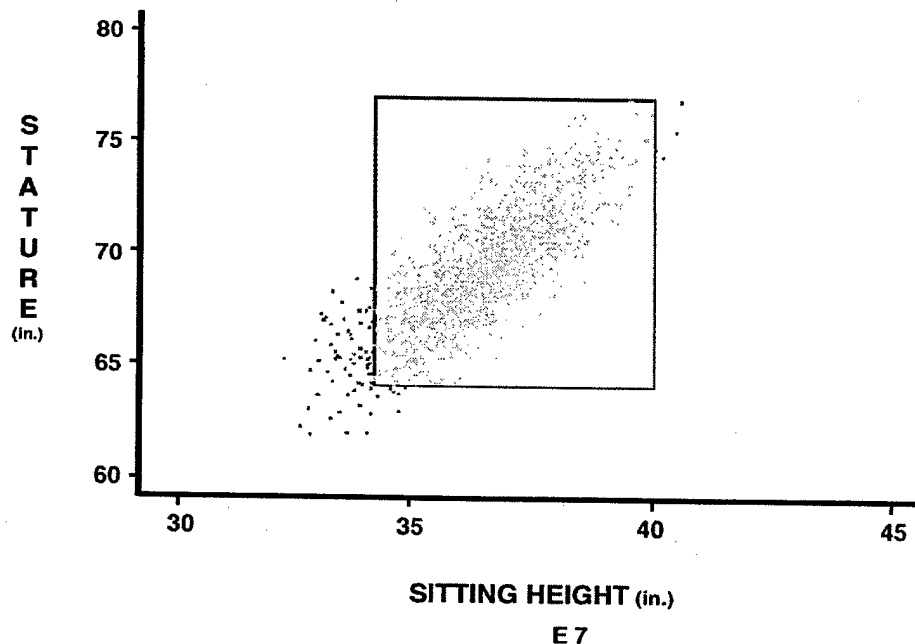
The resulting data sets consisted of 851 females and 1301 males. The next step was to determine the effect of the original JPATS specification on the percentage of females accommodated. Since the specification was based on the entire pilot population as defined by AFI 48-123, the real question was, "what are the effects of this regulation on the percentage of women eligible to become USAF pilots?" Figure 2-1 below shows a bivariate plot of the JPATS female population and the entrance requirements spelled out in AFI 48-123.



Effects of Body Sized Limits on Female Population

Figure 2-1: Effects of Body Sized Limits on Female Population.

Those individuals in the box would be accommodated by the original JPATS specification. While all current USAF pilots would have been eligible under the original specification, only 45% of the JPATS female sample would have been eligible. The next figure (Figure 2-2) is a similar plot of data for the JPATS male sample. Ninety-four percent of the males qualify.



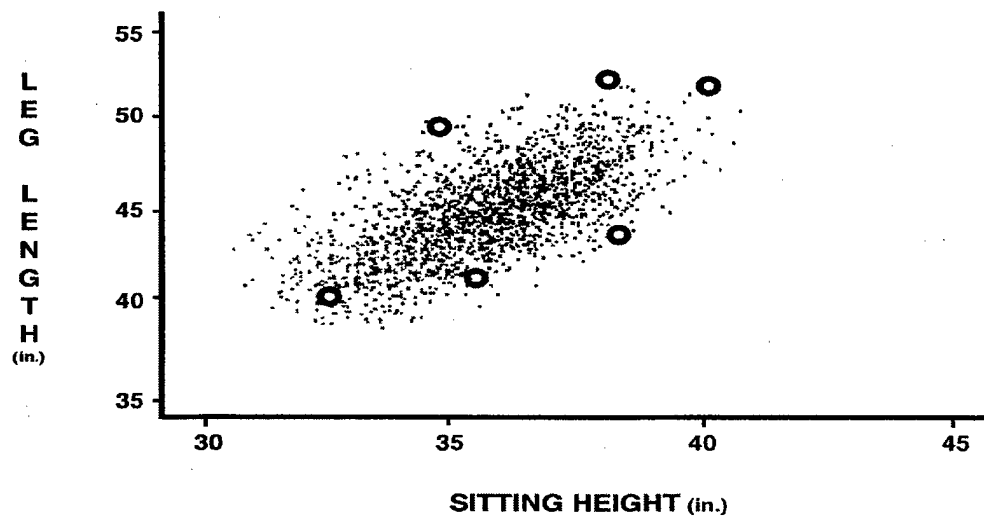
Effects of Body Sized Limits on Male Population
Figure 2-2: Effects of Body Sized Limits on Male Population.

While it is obvious that these restrictions have a severe effect on the percentage of the female population who are eligible to become USAF pilots, it is important to remember that these restrictions were in place long before women were permitted to fly in the Air Force - and they were based on male anthropometric data.

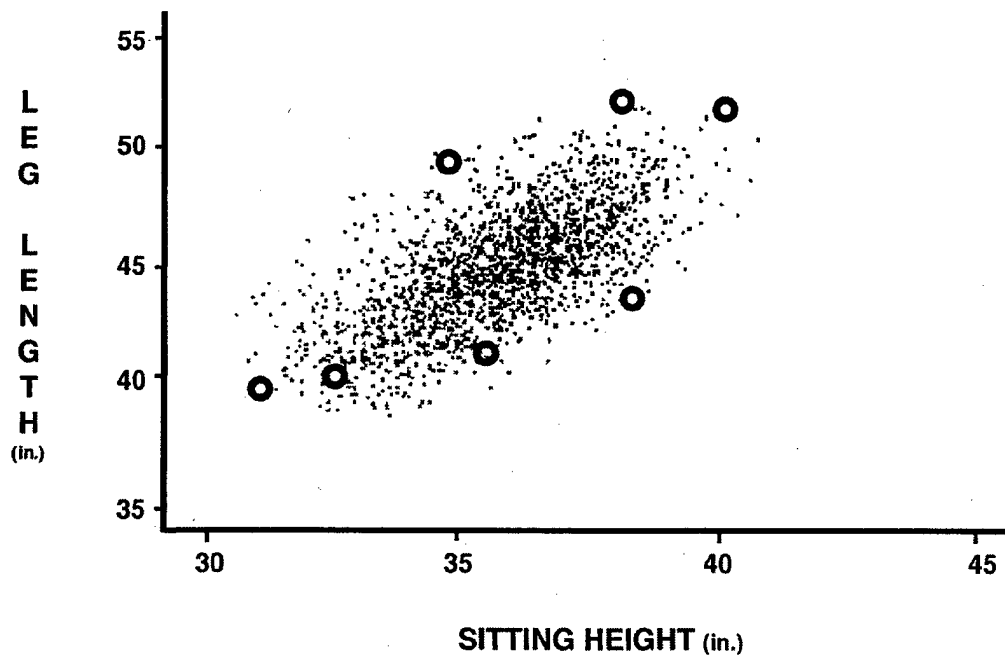
JPATS Cases One and Seven

When the Undersecretary of Defense for Acquisitions (Dr. John Deutch) was informed that the JPATS aircraft might eliminate approximately 55% of females from becoming pilots, he directed the working group to devise a solution that would permit at least 80% of eligible females (defined by the JPATS data sets) to operate the aircraft. Multivariate Case One replaced the original smallest person in the JPATS specification to accomplish that directive. Sitting Height was reduced to 32.8 inches and arm and leg lengths were reduced by approximately one inch from what was previously indicated for the smallest person. Case One Stature can be approximately 61 inches.

Soon after Case One was created, Congressional interest intensified and potential requirements were again expanded. Now it was proposed to accommodate 95% of both males and females. Multivariate Case Seven was developed to satisfy this level of accommodation. Multivariate Case Seven Stature can be approximately 58 inches. Sitting Height is 31 inches. Figure 2-3, below, shows both JPATS populations (male and female) with Cases One through Six illustrated.



JPATS Population With Cases 1-6
 Figure 2-3: JPATS Population with Cases 1-6.



JPATS Population With Cases 1-7
 Figure 2-4: JPATS Population with Cases 1-7.

Figure 2-4, above, shows the same population with Case Seven included. Notice the apparent holes in the pattern of cases surrounding the data. In the upper left part of the graph, the original Case 2 was removed. This case would have had a 45-inch Leg Length and 33 inch Sitting Height. The original Case 8 would have been in the lower left part of the graph, and would have had a ~48-inch Leg Length, and a 41 inch Sitting Height. Both of these Cases were removed by the JPATS Program Office. Case 8 was later restored by the JSF Program Office resulting in the now familiar JSF Cases 1-8, below in Table 2-1. For more technical detail on the JPATS Case selection, please refer to Zehner et al. (1993).

Table 2-1: JSF Multivariate Cases								
	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8
	Small	Medium Build Short	Medium Build Long	Tall Sitting Height Short	Overall Large	Longest Limbs	Overall Small	Largest Torso
Thumb Tip Reach	27	27.6	33.9	29.7	35.6	36	26.1	33.3
Buttock-knee Length	21.3	21.3	26.5	22.7	27.4	27.9	20.8	25.4
Knee-height Sitting	18.7	19.1	23.3	20.6	24.7	24.8	18.1	23.2
Sitting Height	32.8	35.5	34.9	38.5	40	38	31	41
Eye Height Sitting	28	30.7	30.2	33.4	35	32.9	26.8	35.9
Shoulder Height Sitting	20.6	22.7	22.6	25.2	26.9	25	19.5	27.6
Shoulder Breadth Range	14.7-18.1	16.4-20.6	16.2-21.2	16.8-21.7	16.9-22.6	16.8-22.5	14.2-18.0	16.9-22.6
Chest Depth Range	7.4-10.9	6.9-10.6	7.2-11.3	7.1-11.0	7.3-12.1	7.4-12.2	7.2-10.2	7.4-12.4
Thigh Circumference Range	18.5-25.0	17.1-25.0	20.2-27.6	17.6-26.3	18.6-29.2	19.1-29.7	17.8-25.2	18.6-29.1
Weight Range	103 lbs to 245 lbs							
Note: All units are in Inches unless otherwise specified.								

Comparison of Samples: JPATS vs. JSF CAESAR

As described above, the sample that was derived from the Army 1988 Anthropometric Survey consisted of 851 females and 1301 males. The next step undertaken on this project was to compare the summary statistics from that sample with those computed for the JSF CAESAR sample. As seen in Table 2-2, below, there are significant differences in the mean values for the measurements selected for comparison.

Table 2-2: Comparison of JSF and JPATS Female Samples					
	JSF CAESAR SAMPLE (inches)				
	VALID_N	MEAN	MIN	MAX	STD
ACRHTST	723	22.32	18.70	26.46	1.12
CHESTC	723	35.59	29.09	43.03	2.44
BUTKNEL	723	22.80	19.61	26.50	1.21
HEADC	722	21.62	19.45	24.17	0.61
HIPC	721	39.61	31.50	47.24	2.57
KNEHTST	723	20.02	17.05	23.98	1.09
SHOULDBR	723	16.51	13.70	19.29	0.87
SITTHT	723	34.16	29.21	39.13	1.41
STAT	723	64.73	57.72	73.98	2.79
THIC	723	22.83	16.26	28.23	1.79
TTR	723	28.90	24.07	33.78	1.45
WAISTCP	721	28.76	21.93	38.39	2.60
WT (lbs)	723	136.17	86.50	189.50	17.84

	JPATS SAMPLE (inches)				
	VALID_N	MEAN	MIN	MAX	STD
ACRHTST	851	22.17	19.57	25.35	1.04
CHESTC	851	34.92	29.33	40.98	1.95
BUTKNEL	851	22.72	20.04	26.14	1.03
HEADC	851	21.37	19.80	23.31	0.54
HIPC	851	37.38	31.34	43.74	1.86
KNEHTST	851	20.02	17.24	23.39	0.97
SHOULDBR	851	16.74	14.57	19.02	0.73
SITTHT	851	34.00	29.69	37.91	1.30
STAT	851	64.18	58.19	71.61	2.55
THIC	851	22.12	18.15	26.81	1.33
TTR	848	28.52	24.92	33.35	1.31
WAISTCP	851	30.32	24.02	39.72	2.42
WT (lbs)	851	129.56	91.71	171.30	13.22

This difference is due to different Height and Weight parameters used to compile the two samples. The JPATS sample used USAF requirements to select the sample where the JSF sample used the broader of the USAF or Navy Height Weight requirements. This produces a sample with a broader range of values (from smallest to largest) as well as a higher mean values. We believe this is an important addition to the data set because so many of the individuals

deployed in recent conflicts have been reservists. Reservists are generally older and less likely to be held to strict Height/Weight requirements. While it may be a few years before reservists fly the JSF we feel this group adds an important design consideration.

The Figures 2-5 and 2-10, below, are bivariate charts showing overlays of these two samples for cockpit variables. Notice that in all figures the distribution of the JSF CAESAR sample encompasses the JPATS sample. This is primarily due to weight differences and is what we expected based on the summary statistics.

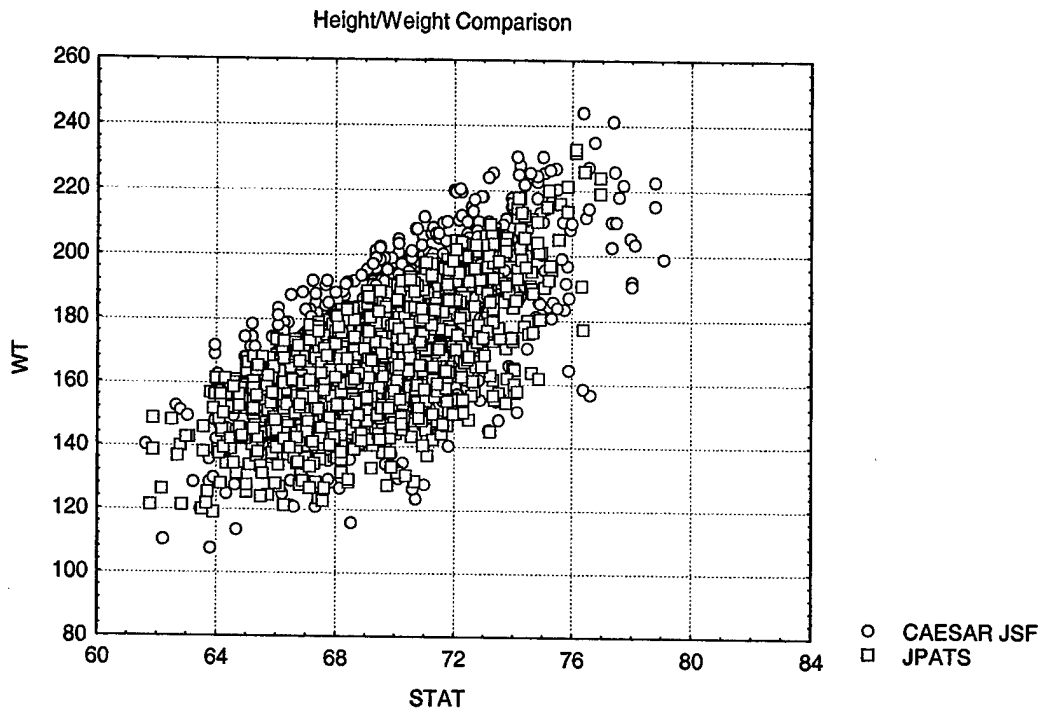


Figure 2-5: Height/Weight Comparison for Males.

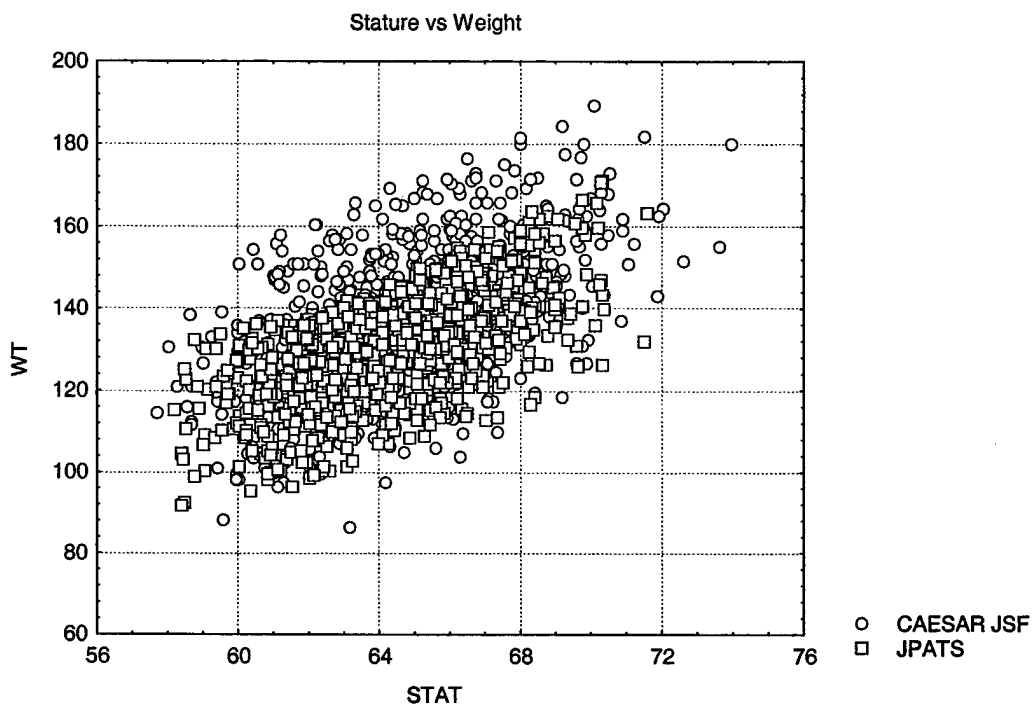


Figure 2-6: Height/Weight Comparison for Females.

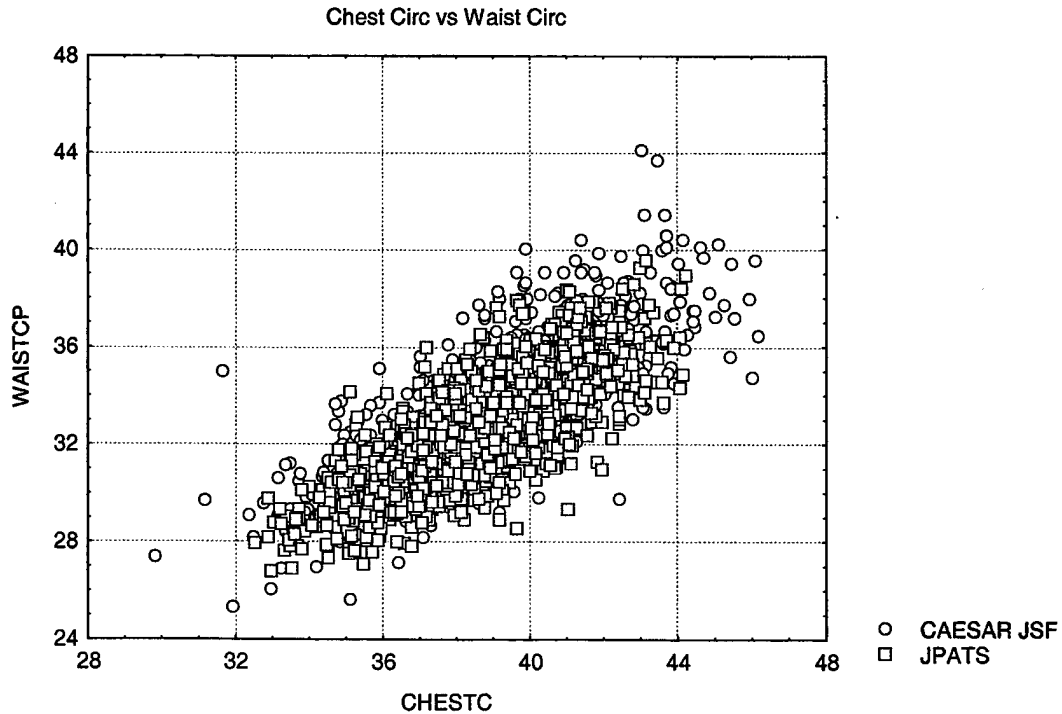


Figure 2-7: Chest Circumference and Waist Circumference Comparison for Males.

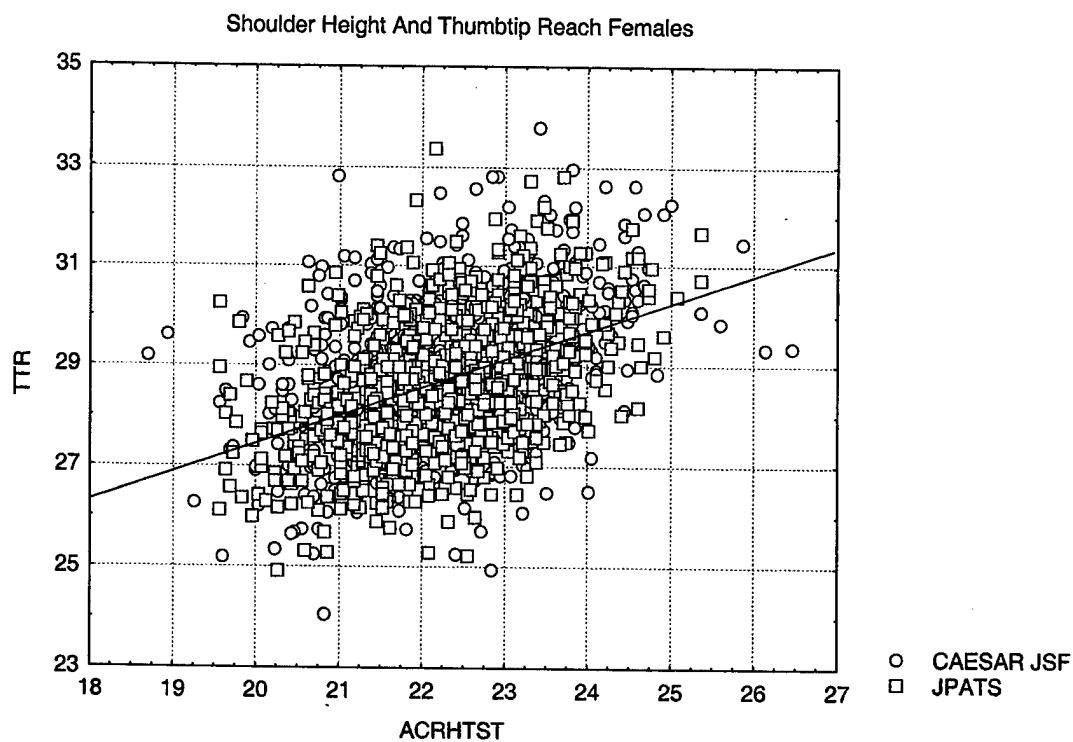


Figure 2-8: Shoulder Height and Thumb-Tip Reach Comparison for Females

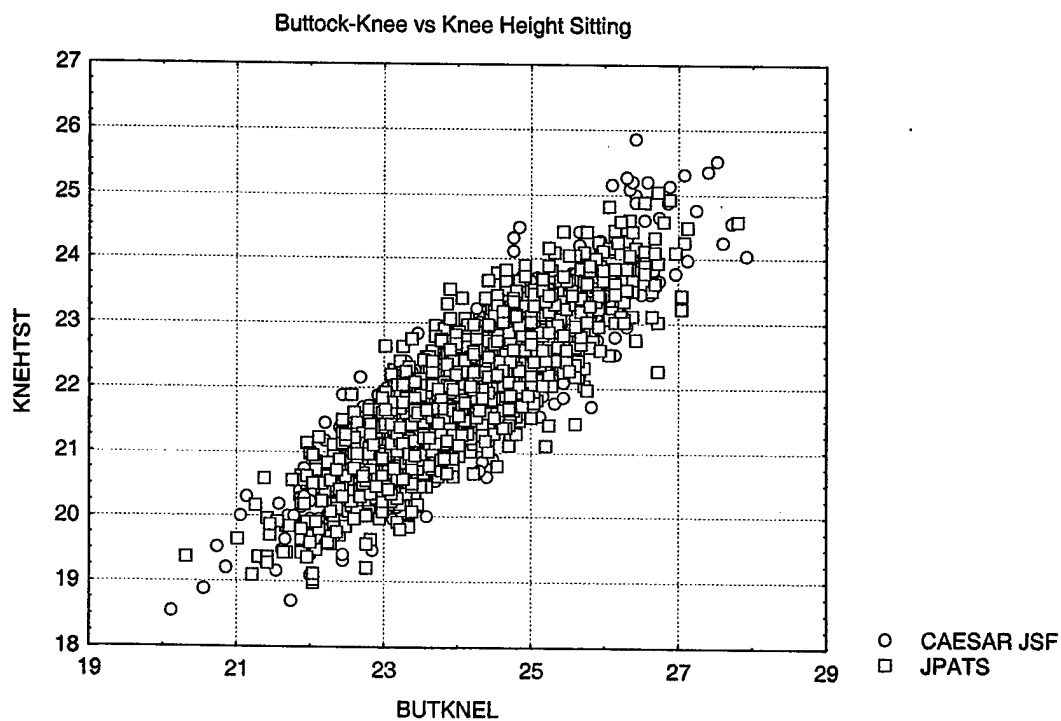


Figure 2-9: Buttock-Knee and Knee Height Sitting Comparison for Males

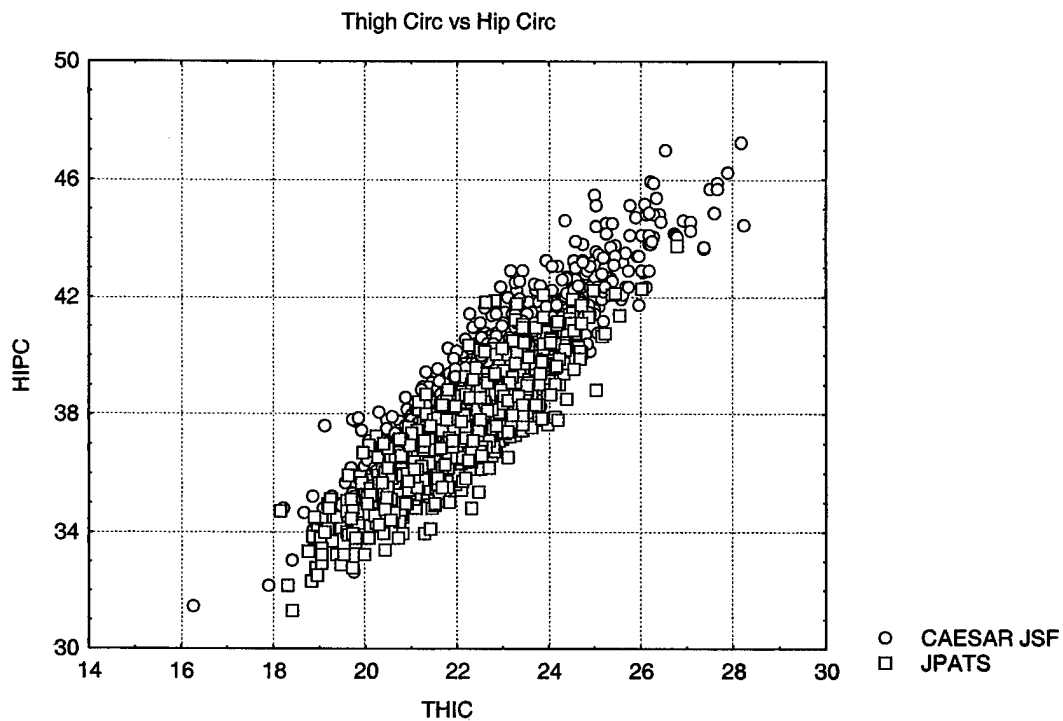


Figure 2-10: Thigh Circumference and Hip Circumference Comparison for Females

A number of additional plots were run (and not reported) and the results were clearly the same. The JSF sample is slightly broader in all directions than the JPATS sample. The mean differences are generally a few tenths of an inch. While statistically significant due to the large sample sizes, these differences will make very little difference in design parameters for JSF apparel and equipment.

CHAPTER 3: FOREIGN FLYING POPULATIONS AND JSF ACCOMMODATION

The foreign anthropometric analysis portion of this project needs to be considered an ongoing process. In the Statement of Work it was stated that we would attempt to gain access to anthropometric databases and pilot requirements for possible foreign users of the JSF. Continuing attempts are being made to do so. The countries and their current pilot requirements, that we have obtained, are included in Table 3-1 below.

Table 3-1: Foreign Pilot Requirements				
COUNTRY	Service	HT/WT Reqs.	Pilot Physical Standards (Min and Max)	Women to fly JSF?
UK	Royal AF		STATURE: - SITTHT: 86.5 cm - 101.0 cm. BUTKNEL: 56.0 cm - 66.0 cm LEG LENGTH: 100.0 cm - 120.0 cm Functional Reach: 74.0 cm - 90.0 cm WEIGHT: 131.2 - 212.8 lbs. (59.5 - 96.5 kilos)	Yes
	Royal Navy		STATURE: 167.5 cm - 193.0 cm SITTHT: 83.0 cm - 100.5 cm. BUTKNEL: 53.5 cm - 66.0 cm LEG LENGTH: 96.0 cm - 122.0 cm Functional Reach: - WEIGHT: 131.2 - 212.8 lbs. (59.5 - 96.5 kilos)	Yes
	Army Air Corps		STATURE: 167.5 cm - 193.0 cm SITTHT: 83.0 cm - 100.5 cm. BUTKNEL: 53.5 cm - 66.0 cm LEG LENGTH: 96.0 cm - 122.0 cm Functional Reach: - WEIGHT: 131.2 - 212.8 lbs. (59.5 - 96.5 kilos)	Yes
Canada	AF		STATURE: 157.0 cm - 194.0 cm SITTHT: 86.4 cm - 100.3 cm. BUTKNEL: 54.6 cm - 67.3 cm LEG LENGTH: 99.60 cm - 123.2 cm Functional Reach: - WEIGHT: -	Yes
Australia	RAAF		STATURE: 163.0 - 193.0 cm SITTHT: < 100.0 cm max BUTKNEL: < 63.5 cm max Leg Length: < 112 cm max	Yes
Netherlands	Air Force	None.	STATURE: < 193 cm, Weight IAW ACES II	
Norway	NoAF		STATURE: 163.0 - 193.0 cm. SITTHT: 83.0 - 99.0 cm (BUTKNEL?) Thigh Length 57.0 - 66.0 cm WEIGHT: ACES II Limit of 100 Kg (220.5 lbs.)	Few
Japan		Given Height: WT & Chest	STATURE: 158.0 - 190.0 cm SITTHT: NONE	NO
Italy				
South Korea				
Singapore				
Turkey				
Denmark				

In Figure 3-1, below, the JSF CAESAR Pilot Size Sample has been plotted for Sitting Height and Buttock Knee Length. Females and males are combined. The univariate maximums and minimums specified by the specific countries are included as range bars. For the UK, the Royal Navy and Air Force ranges were combined to form the broadest ranges. Australia did not have minimums. The same was done for Stature and Leg Length, (Figure 3-2) which allowed range plotting of Japan and The Netherlands who only have Stature as an anthropometric measure specification. For all four variables the JSF CAESAR Pilot Size Sample adequately covers the ranges defined by each country's Pilot Size Criteria.

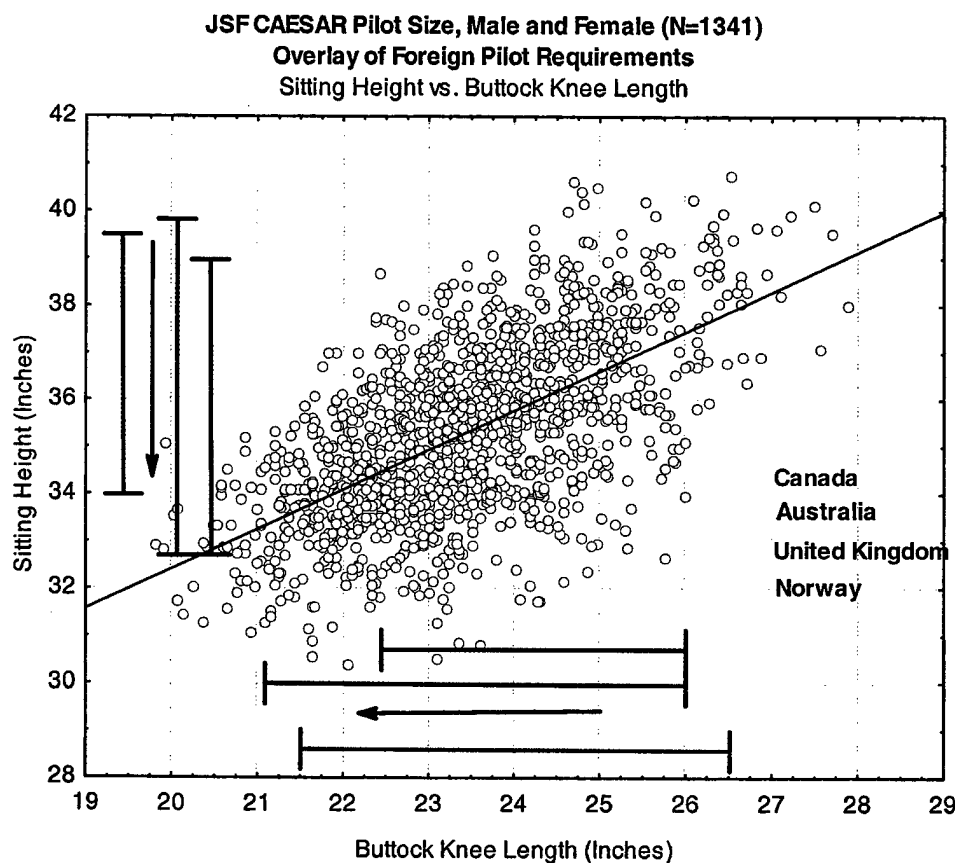


Figure 3-1: Univariate Pilot Requirements for Canada, Australia, United Kingdom (broadest of combined services), and Norway.

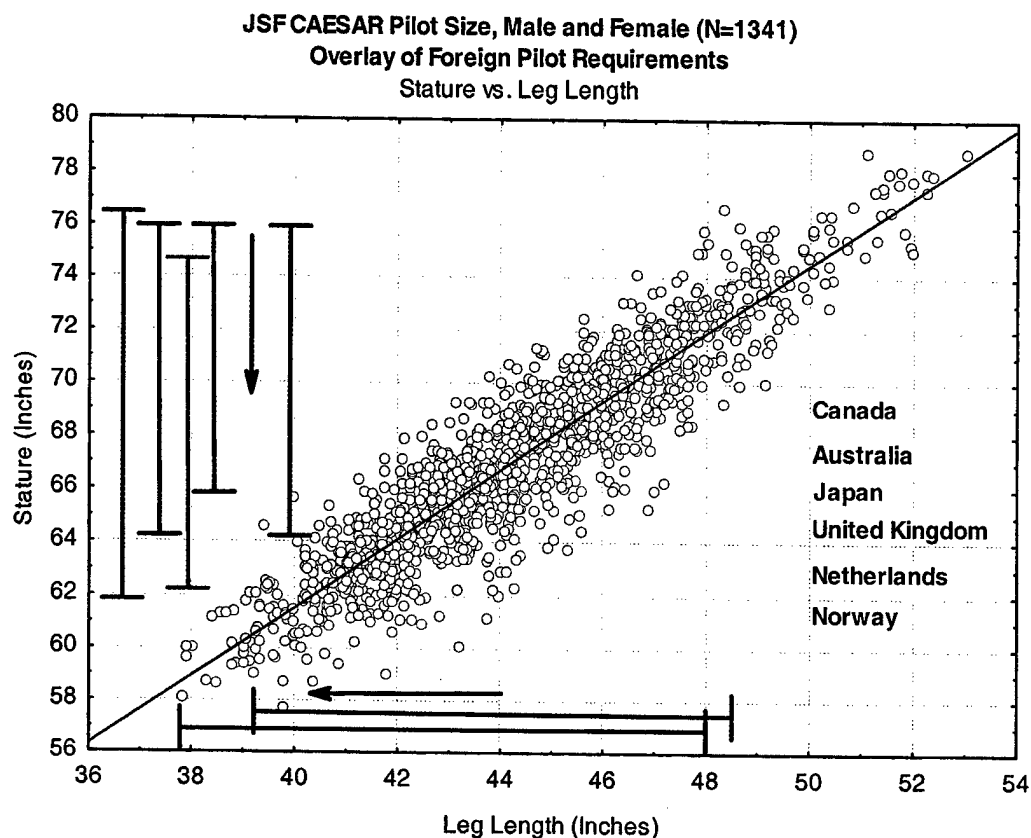


Figure 3-2: Univariate Pilot Requirements for Canada, Australia, United Kingdom (broadest of combined services), Norway, The Netherlands, and Japan.

CAESAR Dutch Samples

The Netherlands Survey contains a total of 1267 subjects. All of their whole body scans and traditional and scan-extracted measurements are included on the accompanying USB drive. In the Excel file, "CAESAR Netherlands," the variable *Current Dutch Pilot* has been included. If a subject is marked with a "1" then they have met the pilot size specifications for the country (Stature < 193 cm, and Weight 103 to 245 lbs.), and an age requirement of 21-50 years old. Two of the males were removed from "current pilot size" assignment. One had incredibly short legs (15.5" Buttock Knee Length, 14.5" Knee Height Sitting) and the other had an "Under Bust Circumference" measurement taken. This resulted in 461 females and 332 males to comprise the CAESAR Dutch Current Pilot Size Sample. Note, however, that there is no predictive weighting of any variables for the year 2010, and that current pilot requirements were used. The summary statistics for this Current Pilot Size Sample of Dutch, for both men and women, are included as separate worksheets in the CAESAR Netherlands excel file.

The Dutch represent the tallest individuals in NATO. In Figure 3-3, below, a plot of the distributions for the Dutch Pilot Size Sample is overlaying the JSF CAESAR Pilot Size Sample. Men and women have been combined. There are 12 Dutch Pilot Size CAESAR Subjects that are outside the distribution coverage of the JSF CAESAR Pilot Size Sample. Since the JSF Pilot

Size Sample was defined using JSF Cases 1-8 and their reconstructed accommodation ellipses, these individuals are OUTSIDE the range of JSF Accommodation, but at the same time, are size-qualified to fly in the Dutch Air Force. Although this is not surprising, it demonstrates the need for apparel designers to examine the impact of these very large potential Dutch JSF Pilots.

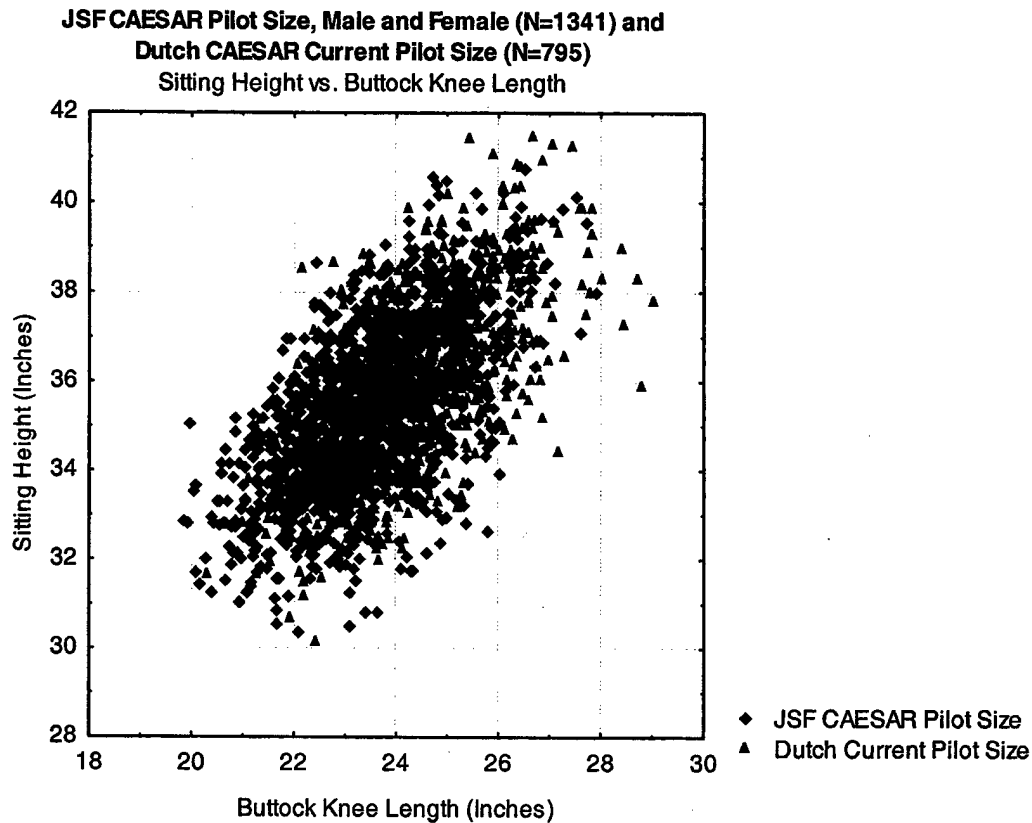


Figure 3-3: Comparison of Dutch CAESAR Pilot Size Sample to JSF CAESAR Pilot Size.

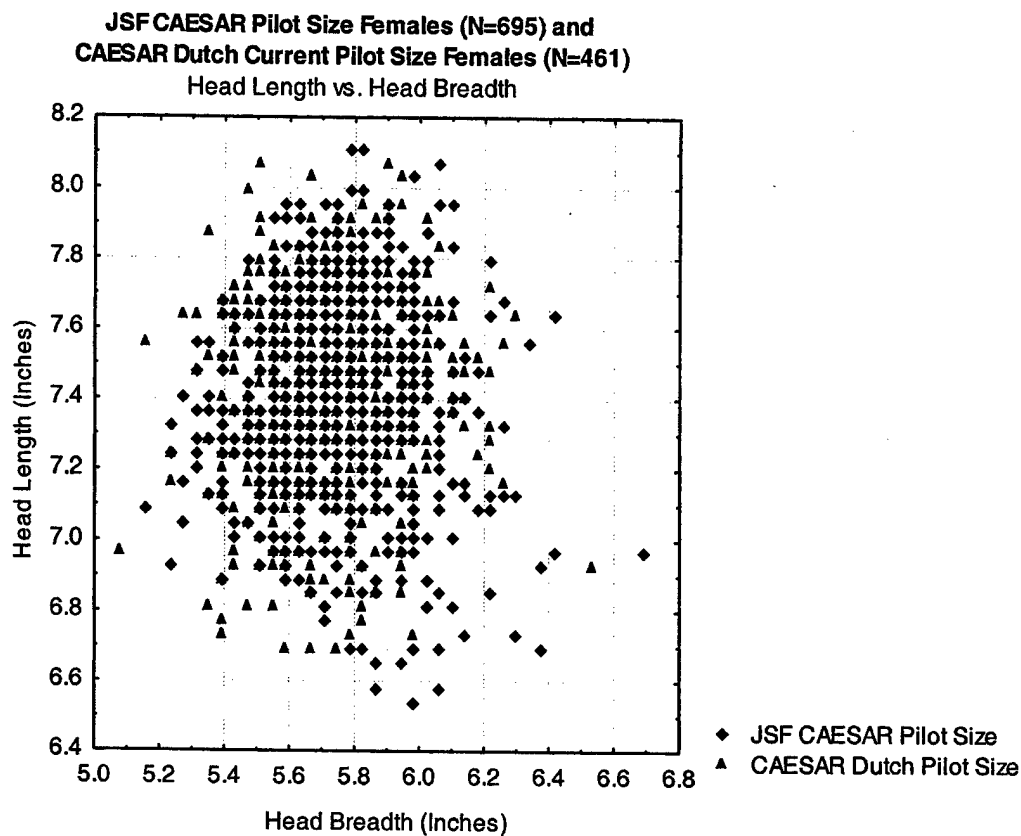


Figure 3-4: Head Breadth vs. Length for the Pilot Size Dutch and JSF CAESAR Pilot Size women.

In Figure 3-4, above, head breadths and lengths are examined between the Dutch Pilot Size females and the JSF CAESAR Pilot Size females. Upon visual examination, in general, the heads of Dutch women appear to be narrower and longer than the JSF women. And, in Figure 3-5, below, it is apparent that facial shape variation is greater in the Dutch women demonstrated by the plot of these measures of facial height (Sellion to Supramenton) and width (Bizygomatic Breadth). The Dutch women, with a smaller sample size, actually span a greater area of variation than the JSF women.

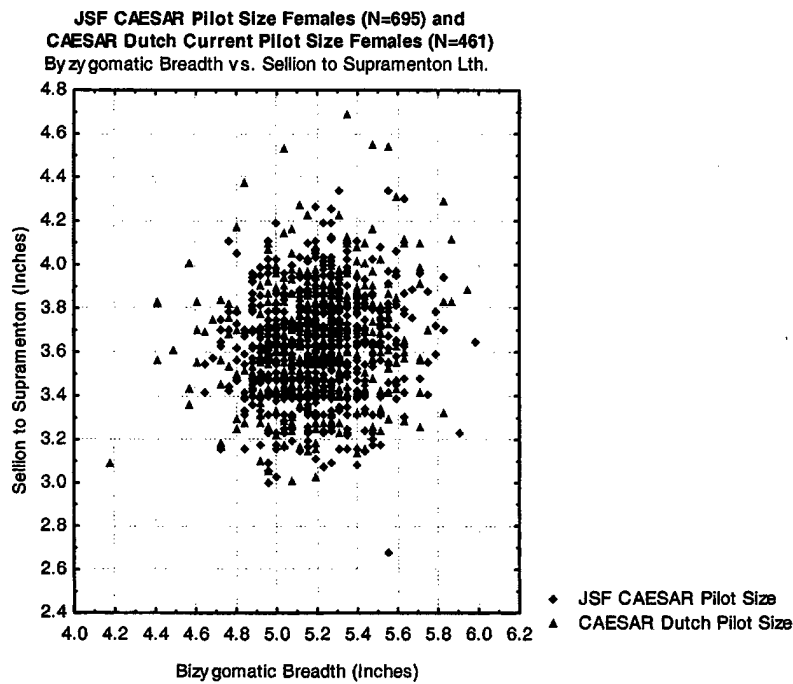


Figure 3-5: Bizygomatic Breadth vs. Sellion to Supramenton Length for the Pilot Size Dutch women and JSF CAESAR Pilot Size women.

The same contrasting pattern of head shape in the women is also seen in the men, but to a much lesser degree. The head shape variation in the men of the JSF CAESAR Pilot Size Sample is highlighted by a handful of specimens with relatively broader and shorter heads (bottom right of graph) than Dutch men (Figure 3-6, below). The men's variation in facial shape (Figure 3-7, below) also demonstrates a trend for the faces of JSF men to be proportionally broader, rather than taller. These differences in facial variation are not as strong as that in the women, however. For the JSF Sample men, more variation is found in the vertical dimension of the face (Sellion to Supramenton) than in the width (Bizygomatic), while the Dutch men are highlighted by the opposite relationship – they vary greater on facial breadth than on height.

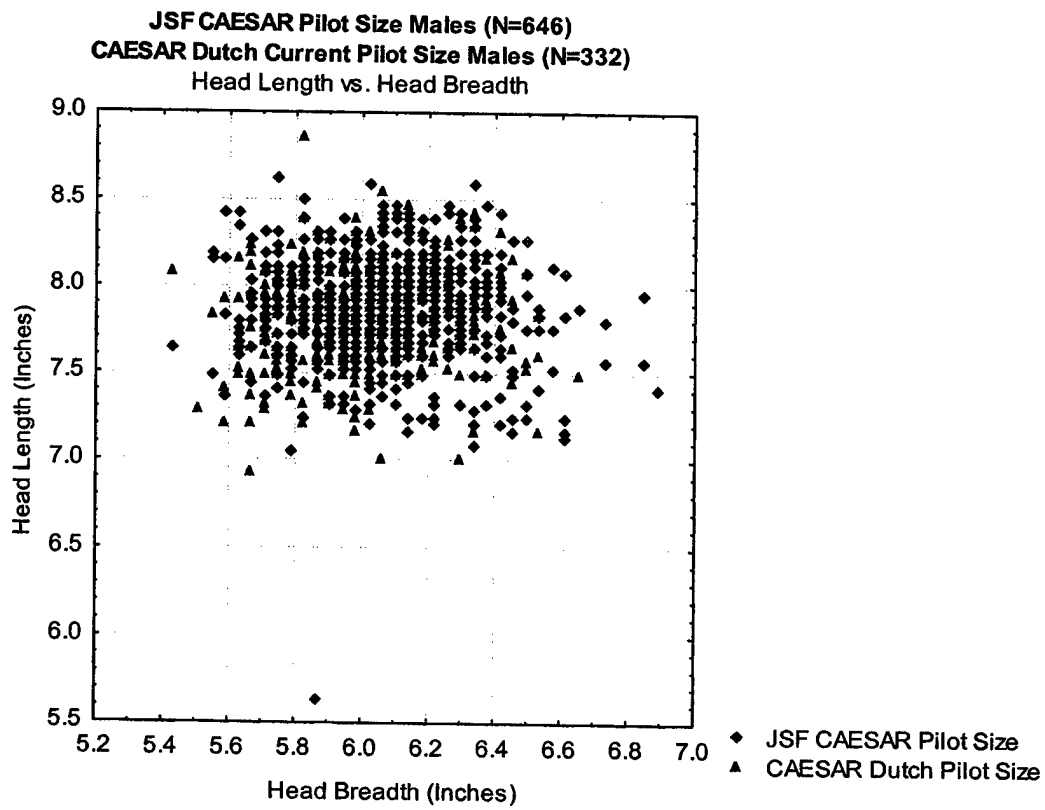


Figure 3-6: Head Breadth vs. Length for the Pilot Size Dutch men and JSF CAESAR men.

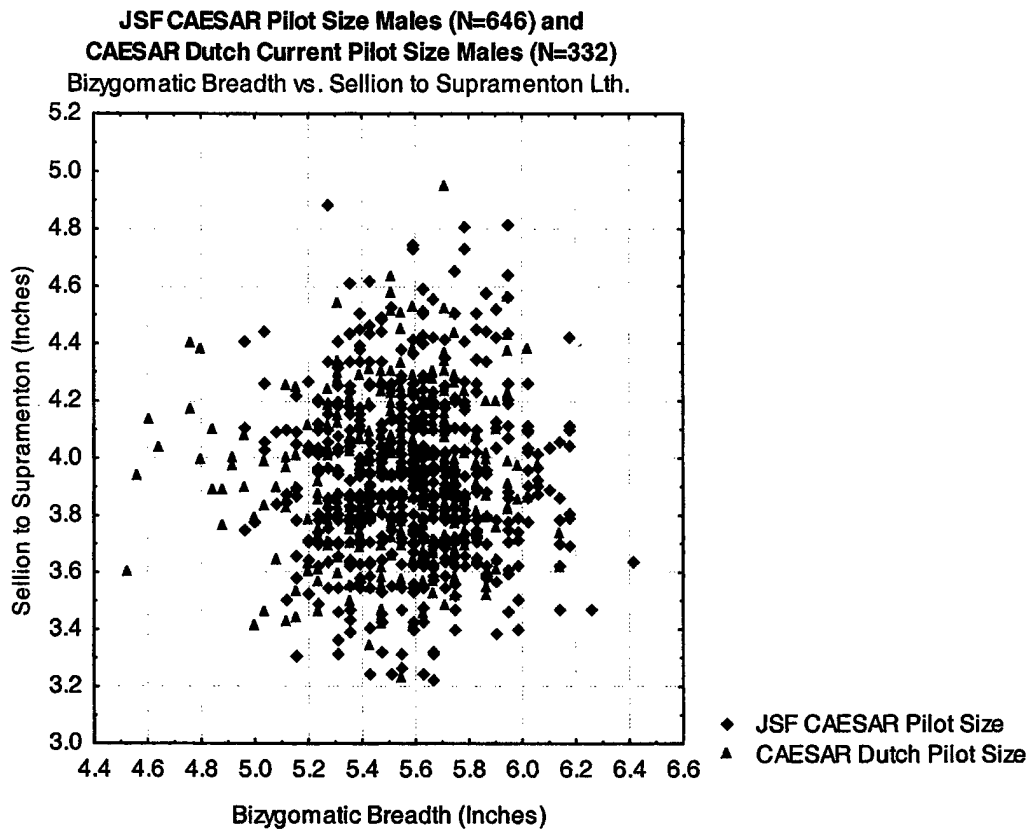


Figure 3-7: Bizygomatic Breadth vs. Sellion to Supramenton Length for the Pilot Size Dutch men and JSF CAESAR men.

To explore the possibility that these contrasts in head and face shape variation are due to differences in racial make up of the samples, the European American (white) portion of the JSF CAESAR Pilot Size Sample was used exclusively. Below in Figure 3-8, the distributions for Head Breadth and Length (using only white JSF Pilot Size women) has diminished the contrast seen above, when all races from JSF were used. However, as expected, reducing the sample size for the JSF women, by selecting only whites, could not “expand” their facial variation to match that of the Dutch women. It is likely that the Dutch sample included races or ethnic groups (hence adding face shape diversity to their sample) that are not included in the JSF CAESAR Pilot Size Sample. During the Dutch Survey recording of race could only be Dutch – born in the Netherlands, and Dutch – not born in the Netherlands. Thus, the contrast in head shape variation was most likely due to non-white variation introduced by the JSF CAESAR sample, while the contrast in facial variation was probably a product of ethnic variation in the CAESAR Dutch Sample, but unfortunately could not be identified and removed for examination. Further below, in Figures 3-10 and 3-11, the same is demonstrated for the men as was for the women above. The differences in head shape variation (Figure 3-10) were diminished by selecting only the white men of the JSF CAESAR Pilot Size Sample. The contrasting variation in facial shape (Figure 3-11) was retained, however.

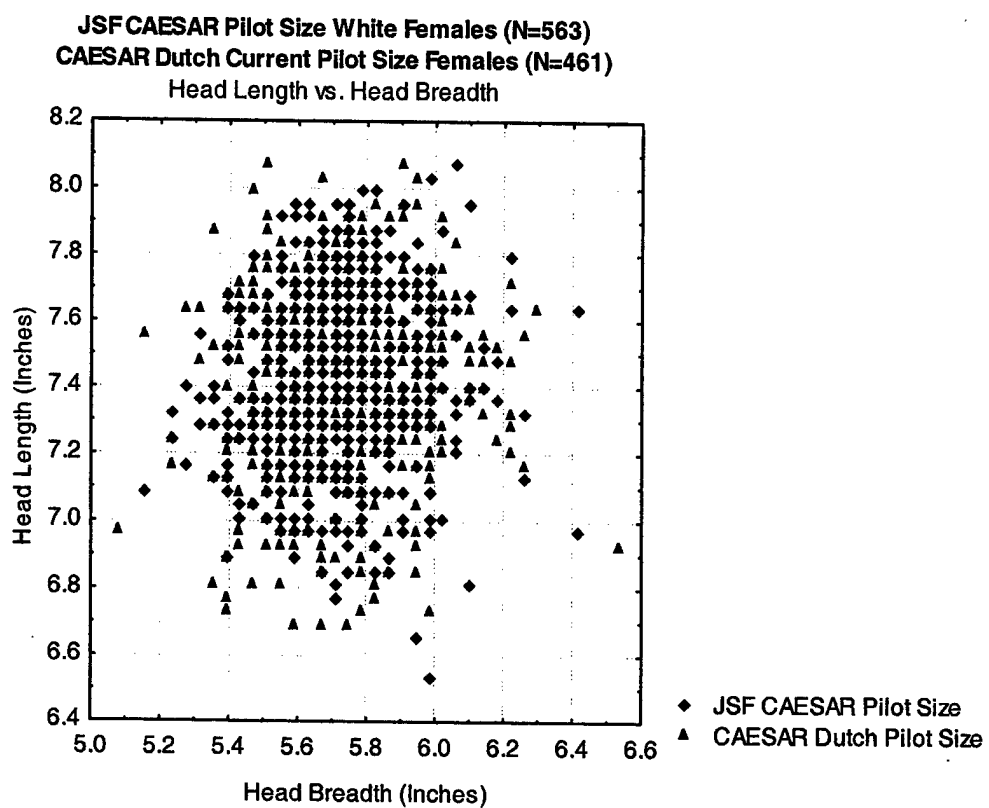


Figure 3-8: Head Breadth vs. Length for the Pilot Size Dutch women and JSF CAESAR white women.

**JSF CAESAR Pilot Size White Females (N=563) and
CAESAR Dutch Current Pilot Size Females (N=461)**
Bizygomatic Breadth vs. Sellion to Supramenton Lth.

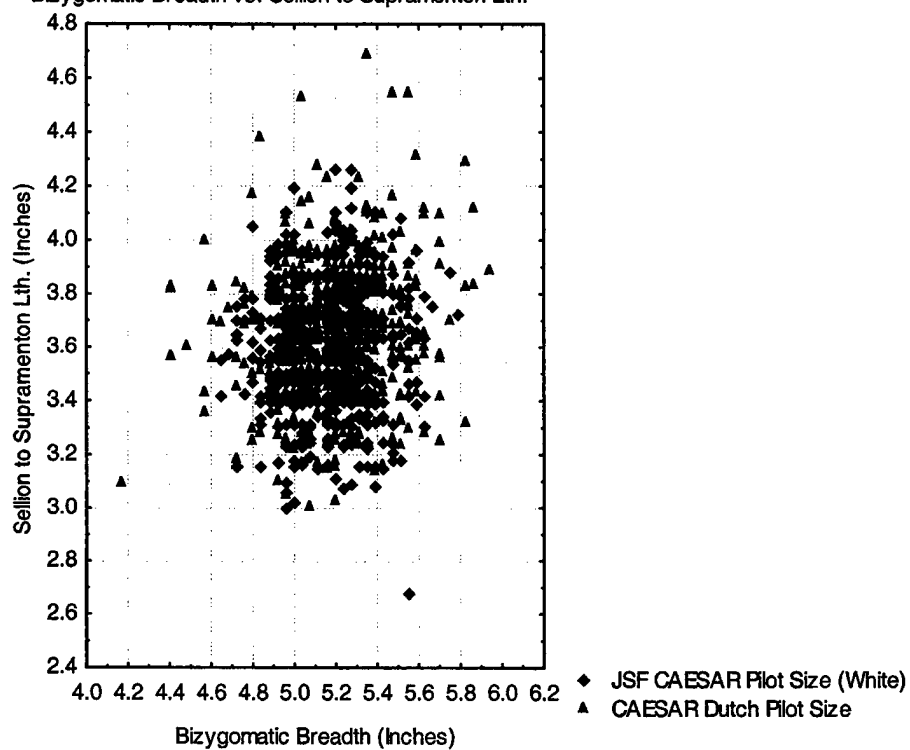


Figure 3-9: Bizygomatic Breadth vs. Sellion to Supramenton Length for the Pilot Size Dutch women and JSF CAESAR white women.

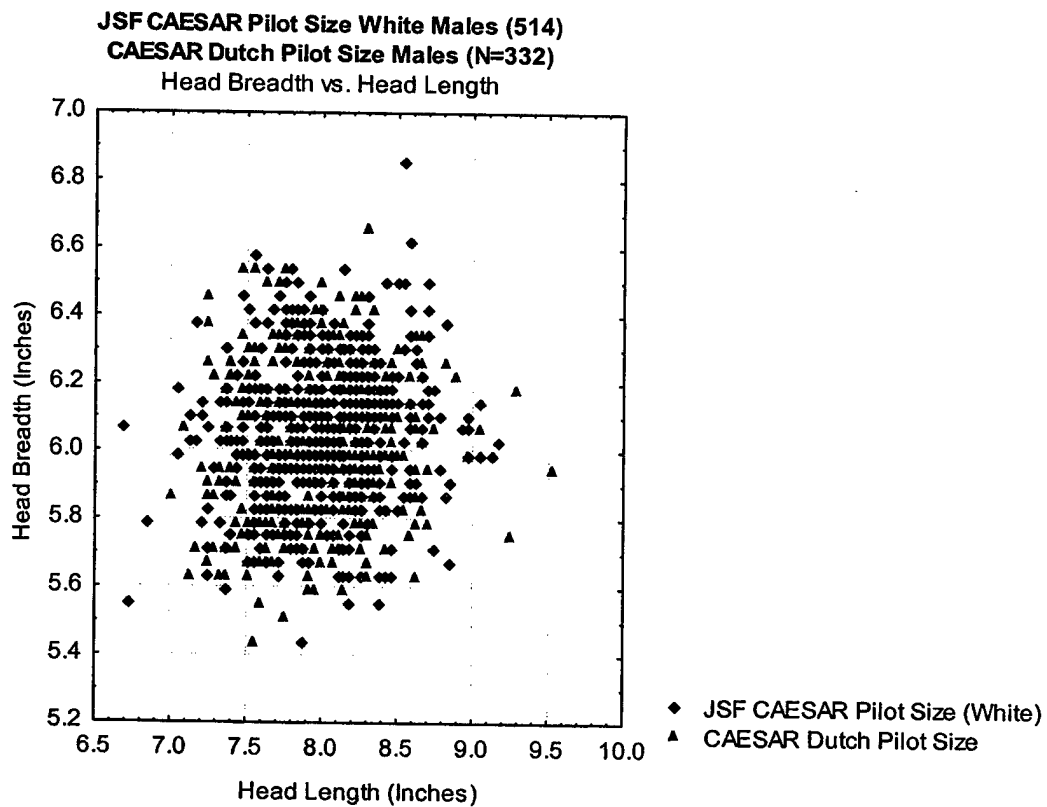


Figure 3-10: Head Breadth vs. Length for the Pilot Size Dutch men and JSF CAESAR men.

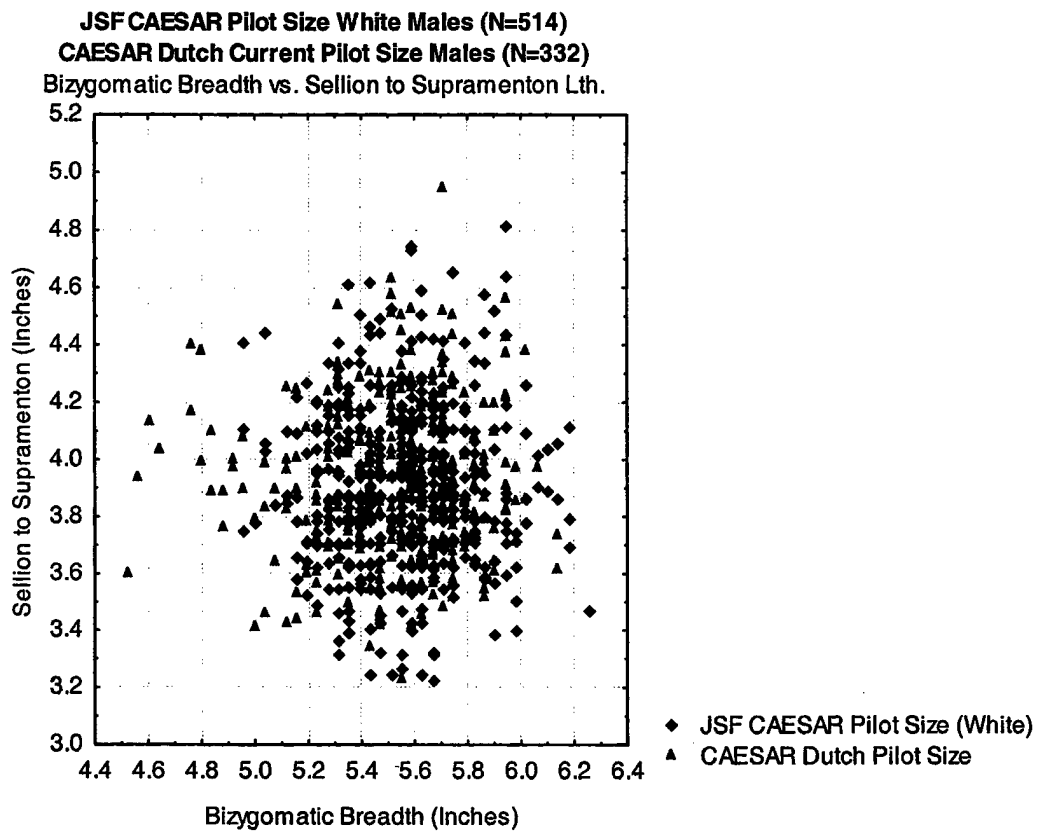
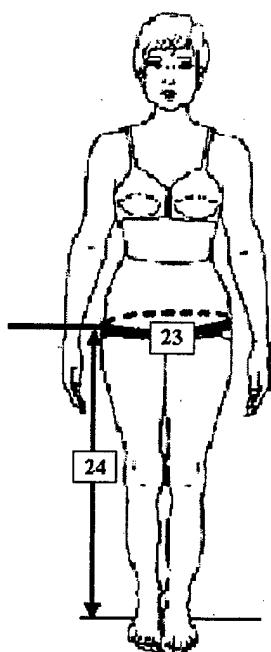
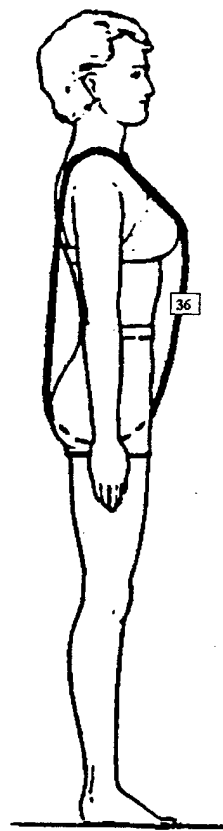
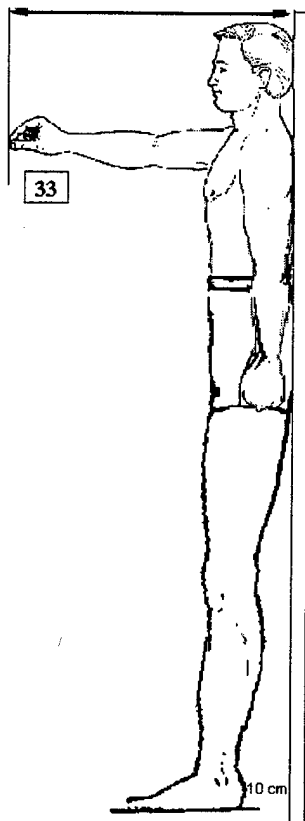
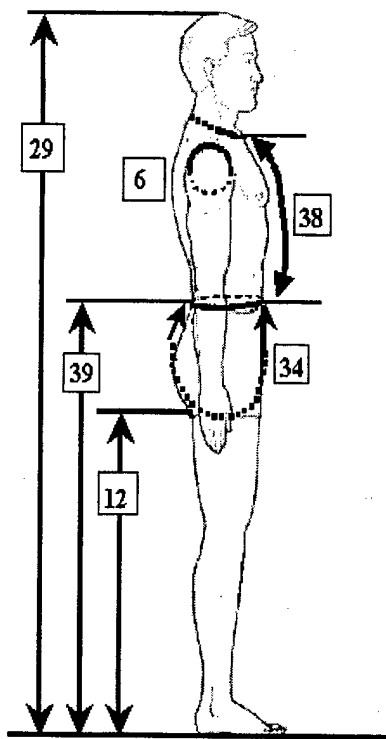


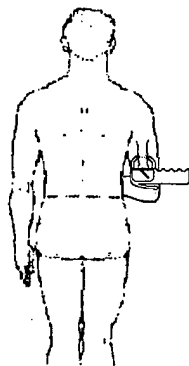
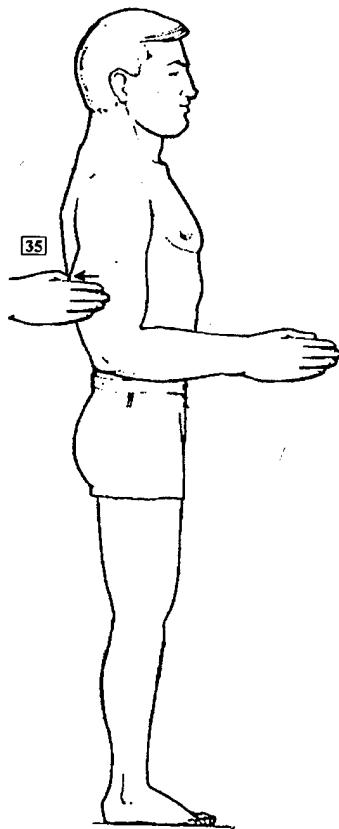
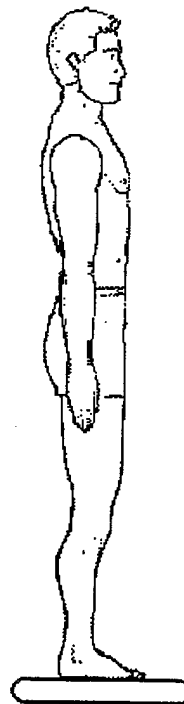
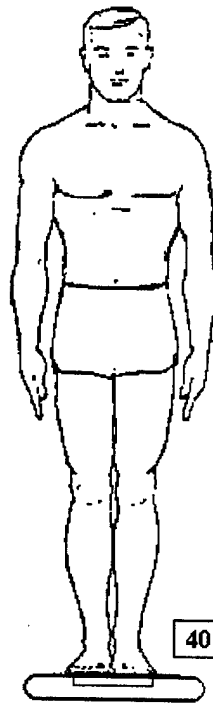
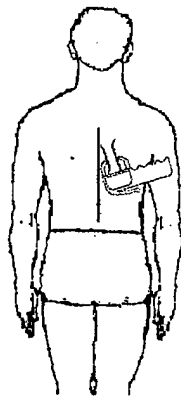
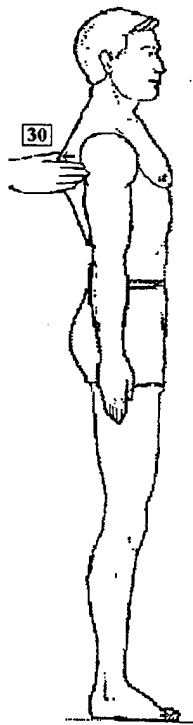
Figure 3-11: Bizygomatic Breadth vs. Sellion to Supramenton Length for the Pilot Size Dutch men and JSF CAESAR white men.

CHAPTER 4: VISUAL INDEX

This chapter contains a visual index of measurements. This index is useful for identifying the name of the variable of interest, in order to locate the summary statistics for that variable within this document.



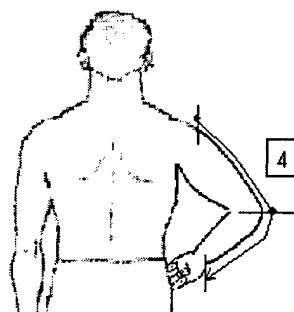
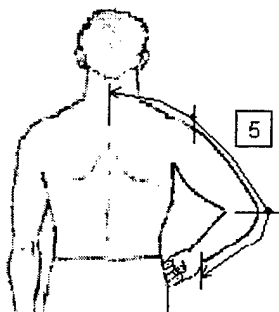
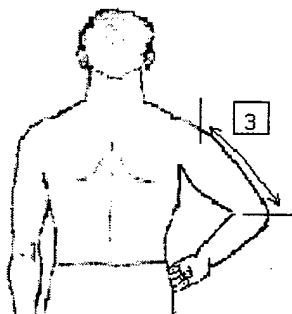
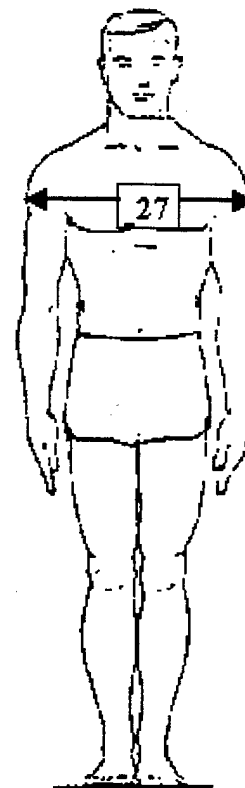
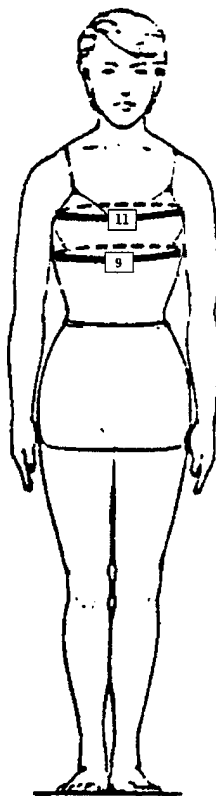
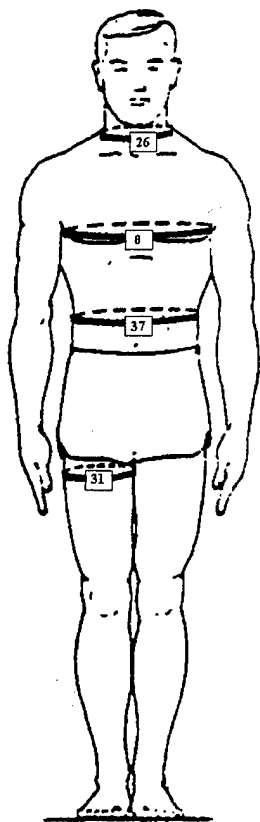
- 6. Armscye Circumference (Scye Circumference over Acromion)
- 12. Crotch Height
- 23. Hip Circumference, Maximum
- 24. Hip Circumference, Maximum, Height
- 29. Stature (Body Height)
- 33. Thumb Tip Reach, Right
- 34. Total Crotch Length
- 36. Vertical Truck Circumference, Right
- 38. Waist Front Length
- 39. Waist Height, Preferred



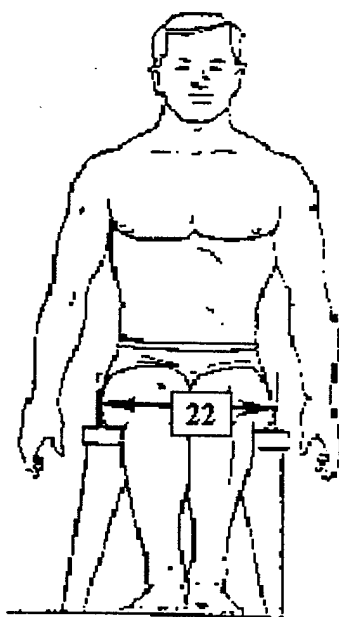
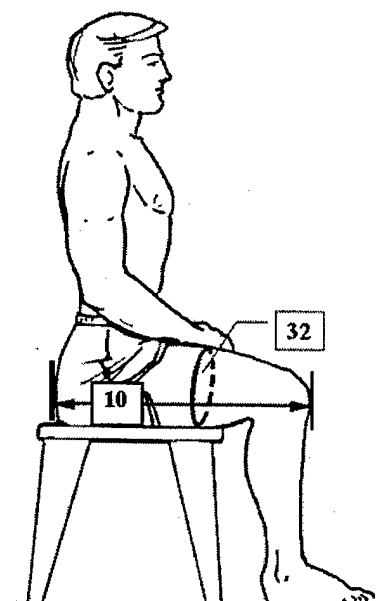
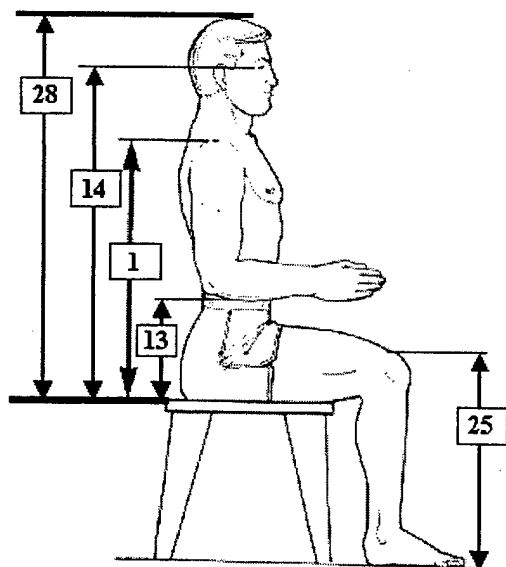
30. Subscapular Skinfold, Right

35. Triceps Skinfold

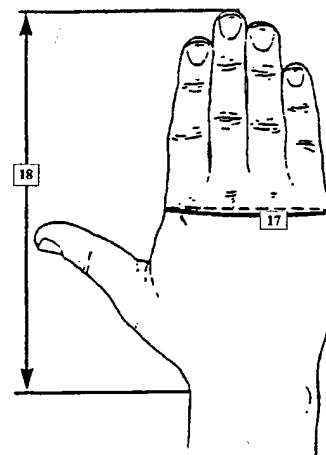
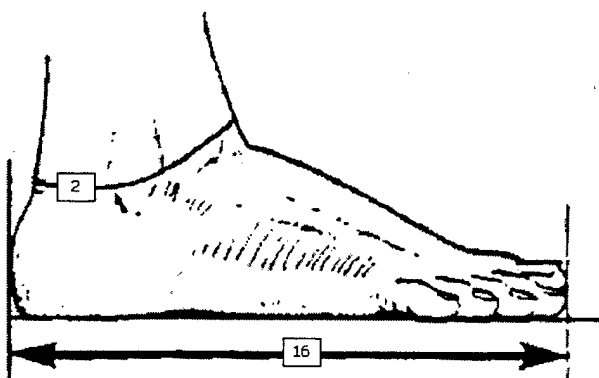
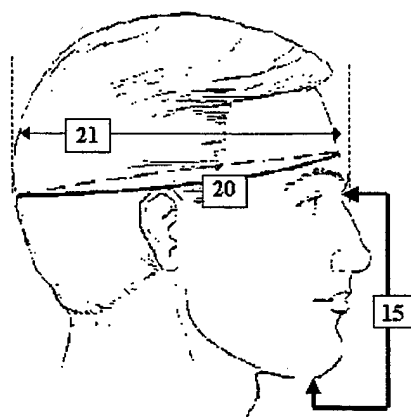
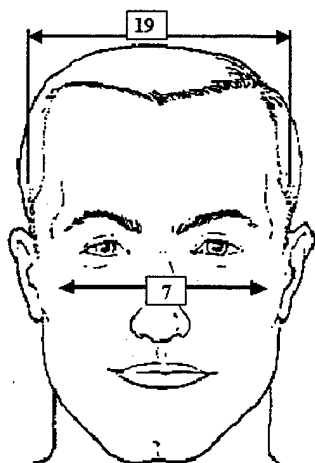
40. Weight (Mass)



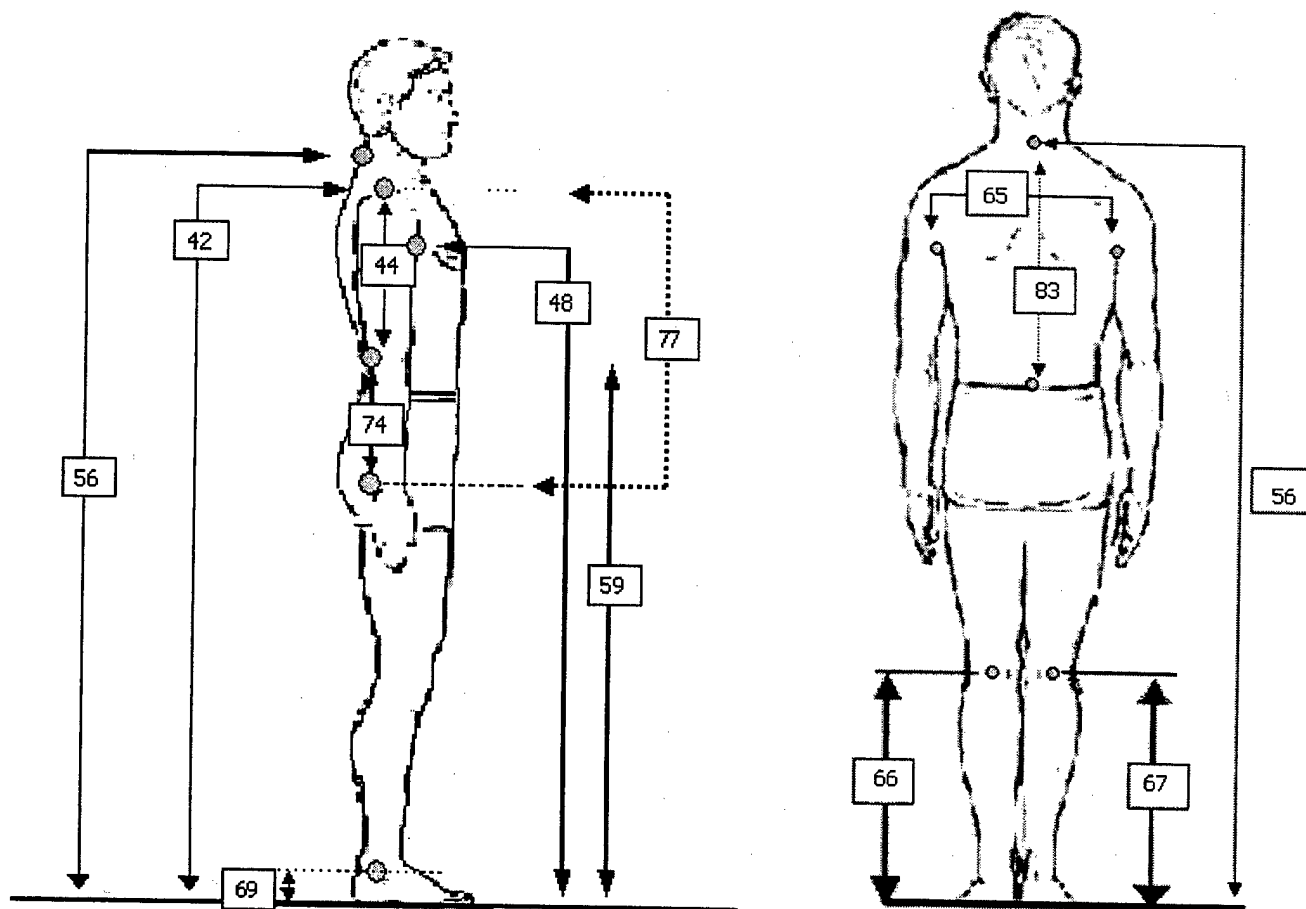
3. Arm Length (Shoulder-Elbow)
4. Arm Length (Shoulder-Wrist)
5. Arm Length (Spine-Wrist)
8. Bust/Chest Circumference
9. Bust/Chest Circumference Under Bust
11. Chest Girth (Chest Circumference at Scye)
26. Neck Base Circumference
27. Shoulder Breadth (Bideltoid)
31. Thigh Circumference, Maximum, Right
37. Waist Circumference, Preferred



- 1. Acromial Height, Sitting
- 10. Buttock-Knee Length, Right
- 13. Elbow Height, Sitting, Right
- 14. Eye Height, Sitting, Right
- 22. Hip Breadth, Sitting
- 25. Knee Height, Sitting, Right
- 28. Sitting Height
- 32. Thigh Circumference, Maximum, Sitting, Right

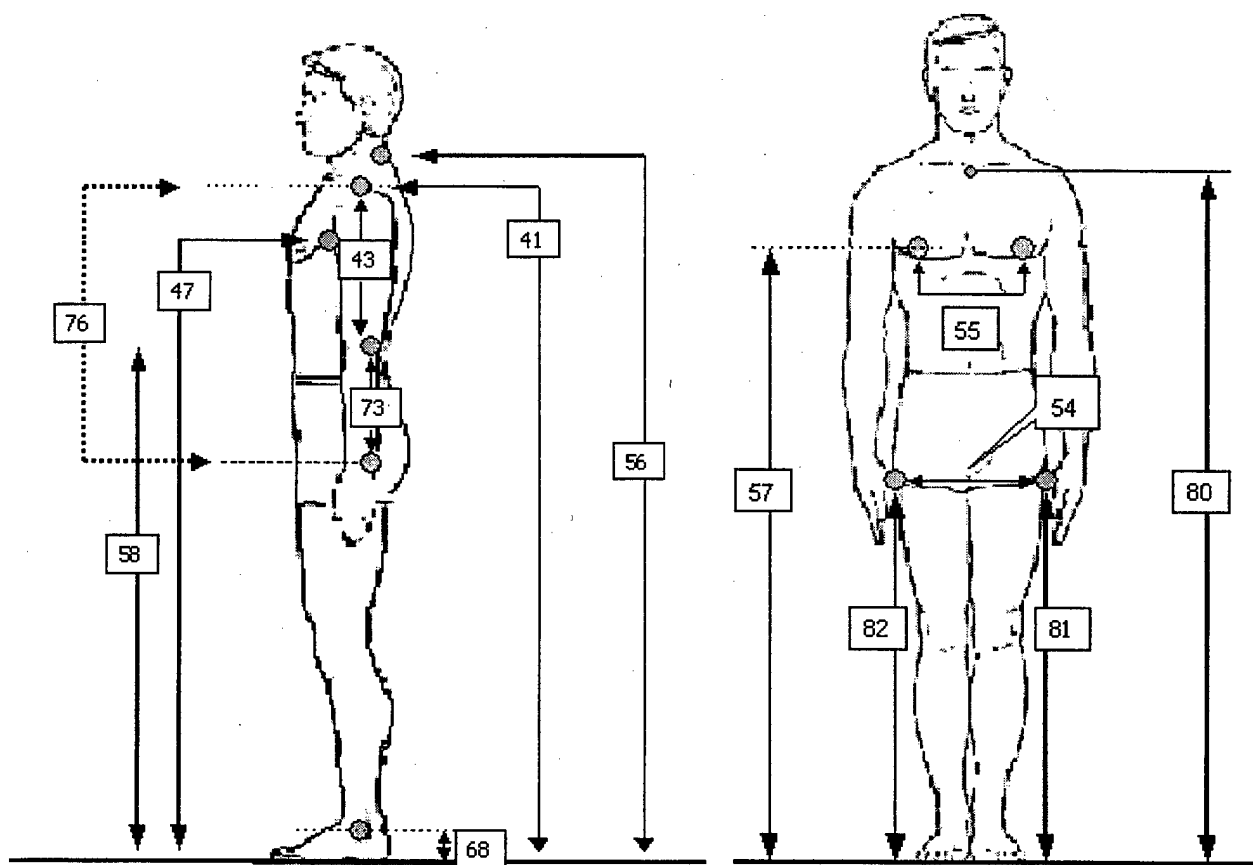


- 2. Ankle Circumference
- 7. Bizygomatic Breadth
- 15. Face Length (Menton-Sellion Length)
- 16. Foot Length, Right
- 17. Hand Circumference, Right
- 18. Hand Length, Right
- 19. Head Breadth
- 20. Head Circumference
- 21. Head Length



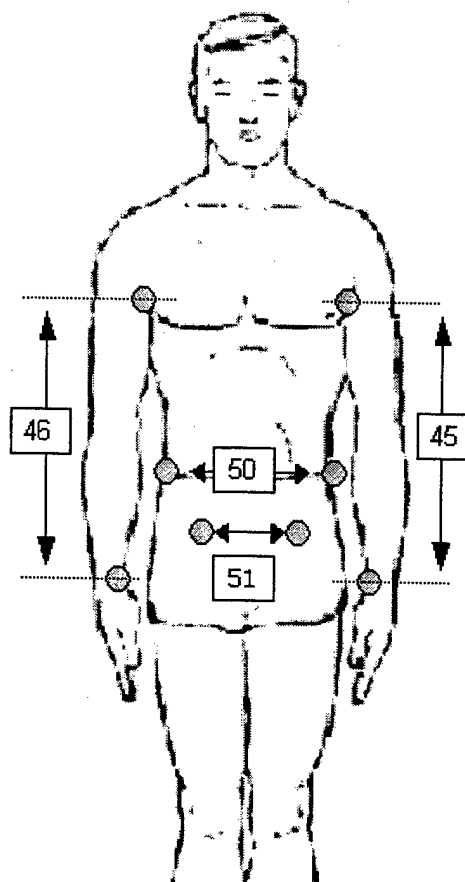
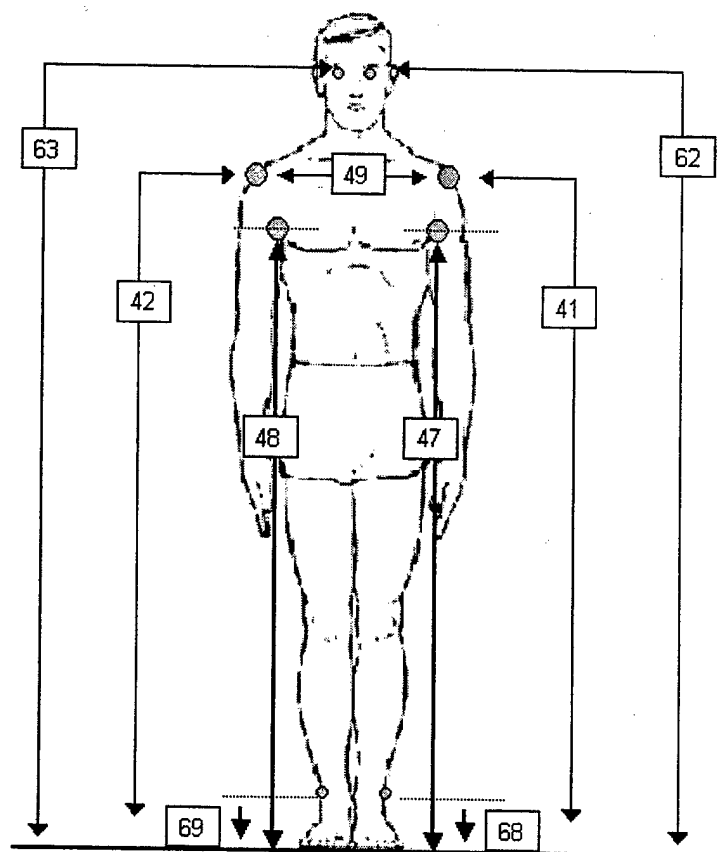
- 42. Acromial Height, Standing, Right
- 44. Acromion-Radiale Length, Right
- 48. Axilla Height, Right
- 56. Cervicale Height
- 59. Elbow Height, Standing, Right
- 69. Malleolus Height, Lateral, Right
- 74. Radiale-Stylian Length, Right
- 77. Sleeve Outseam Length, Right

- 56. Cervicale Height
- 65. Interscye Distance
- 66. Knee Height, Standing, Left
- 67. Knee Height, Standing, Right
- 83. Waist Back (Cervicale to Waist) Length



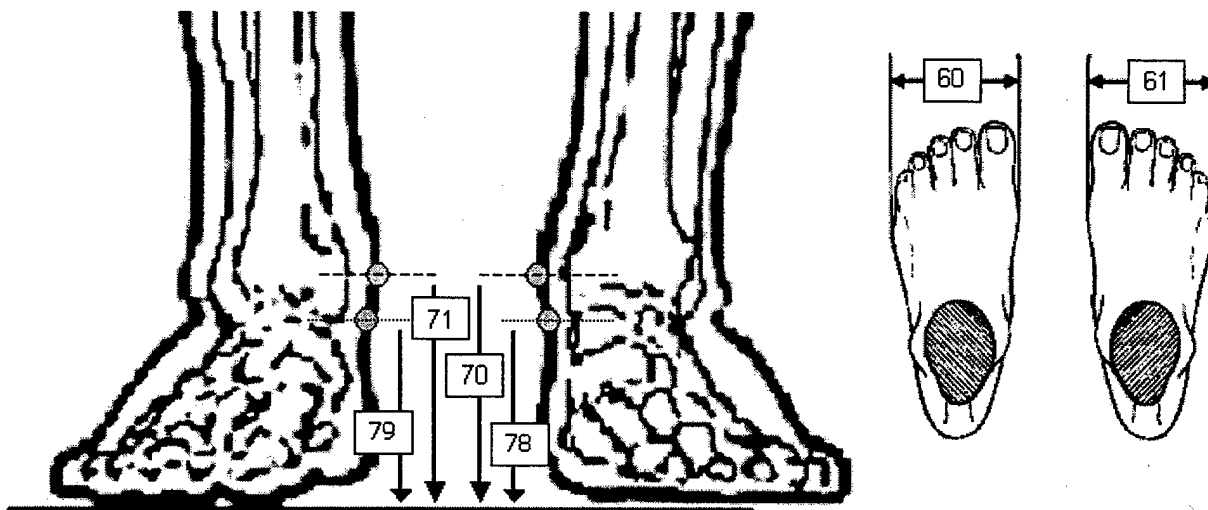
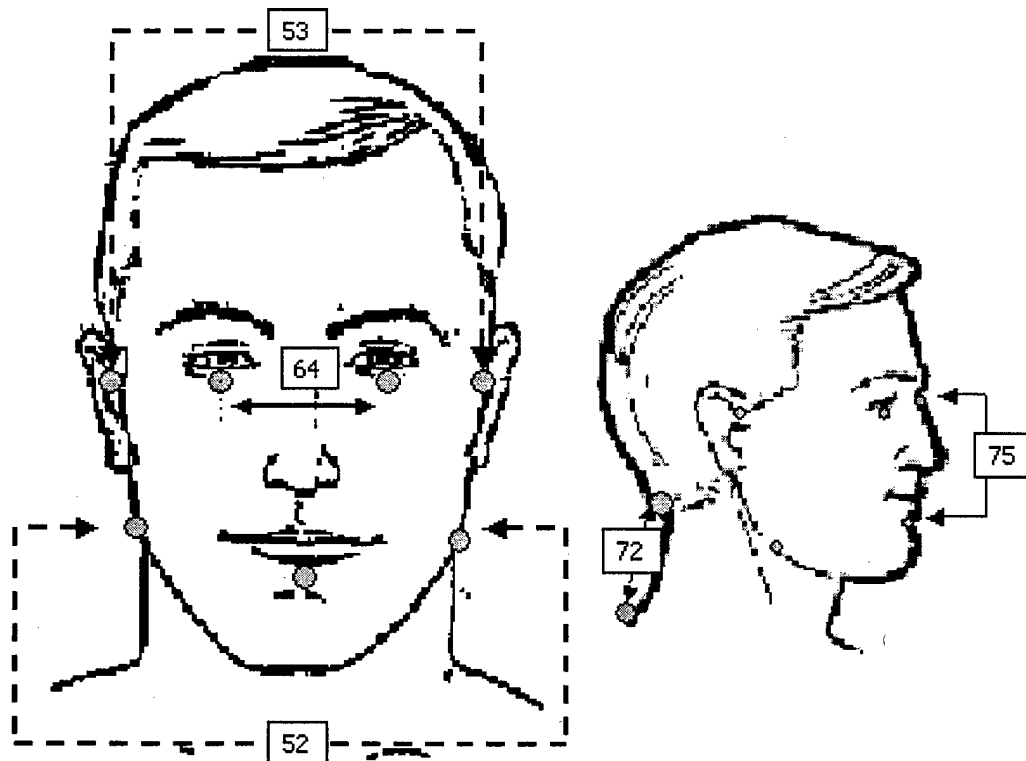
- 41. Acromial Height, Standing, Left
- 43. Acromion-Radiale Length, Left
- 47. Axilla Height, Left
- 56. Cervicale Height
- 58. Elbow Height, Standing, Left
- 68. Malleolus Height, Lateral, Left
- 73. Radiale-Stylian Length, Left
- 76. Sleeve Outseam Length, Left

- 54. Bi-Trochanteric Breadth, Standing
- 55. Bustpoint-Bustpoint Breadth
- 57. Chest Height
- 80. Suprasternale Height
- 81. Trochanter Height, Left
- 82. Trochanter Height, Right



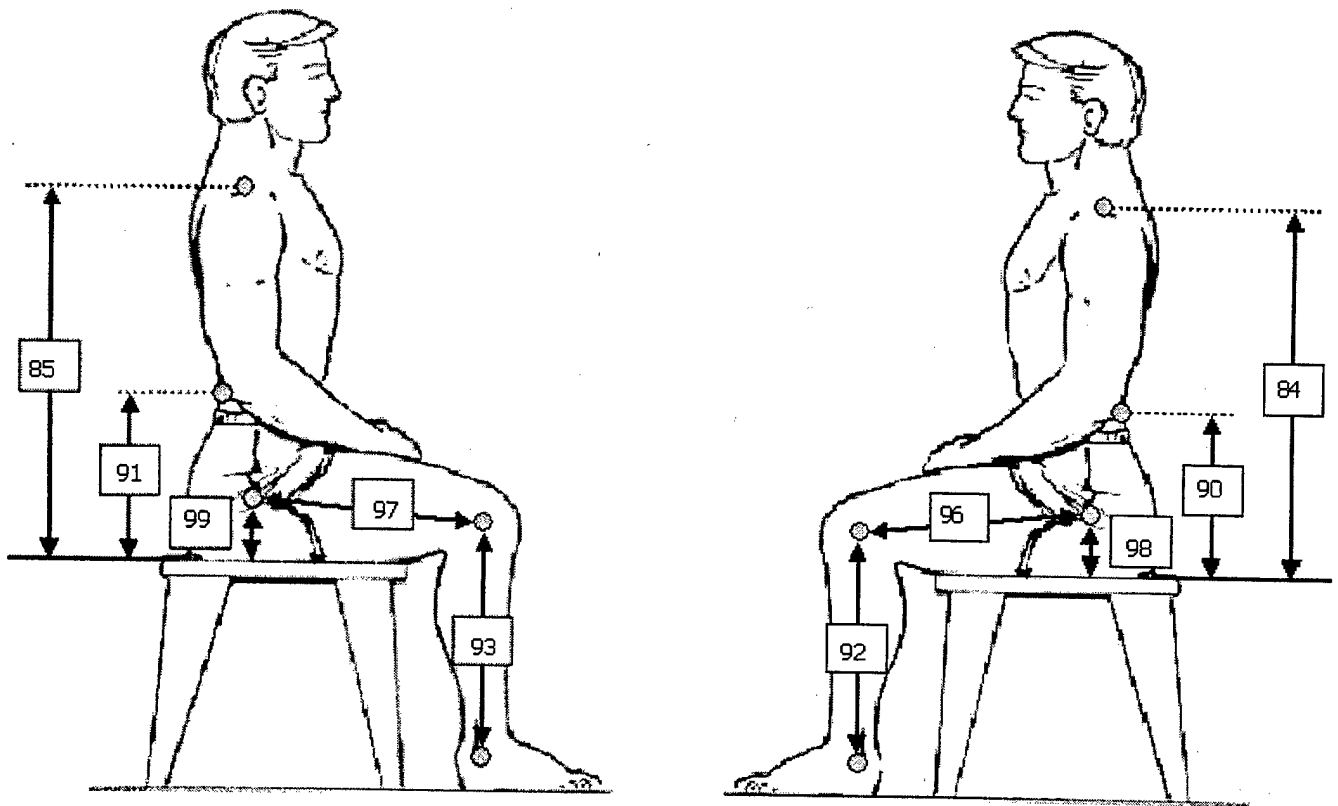
- 41. Acromial Height, Standing, Left
- 42. Acromial Height, Standing, Right
- 47. Axilla Height, Left
- 48. Axilla Height, Right
- 49. Biacromial Breadth
- 62. Infraorbitale Height, Standing, Left
- 63. Infraorbitale Height, Standing, Right
- 68. Malleolus Height, Lateral, Left
- 69. Malleolus Height, Lateral, Right

- 45. Arm Inseam, Left
- 46. Arm Inseam, Right
- 50. Bi-Cristale Breadth
- 51. Bi-Spinous Breadth

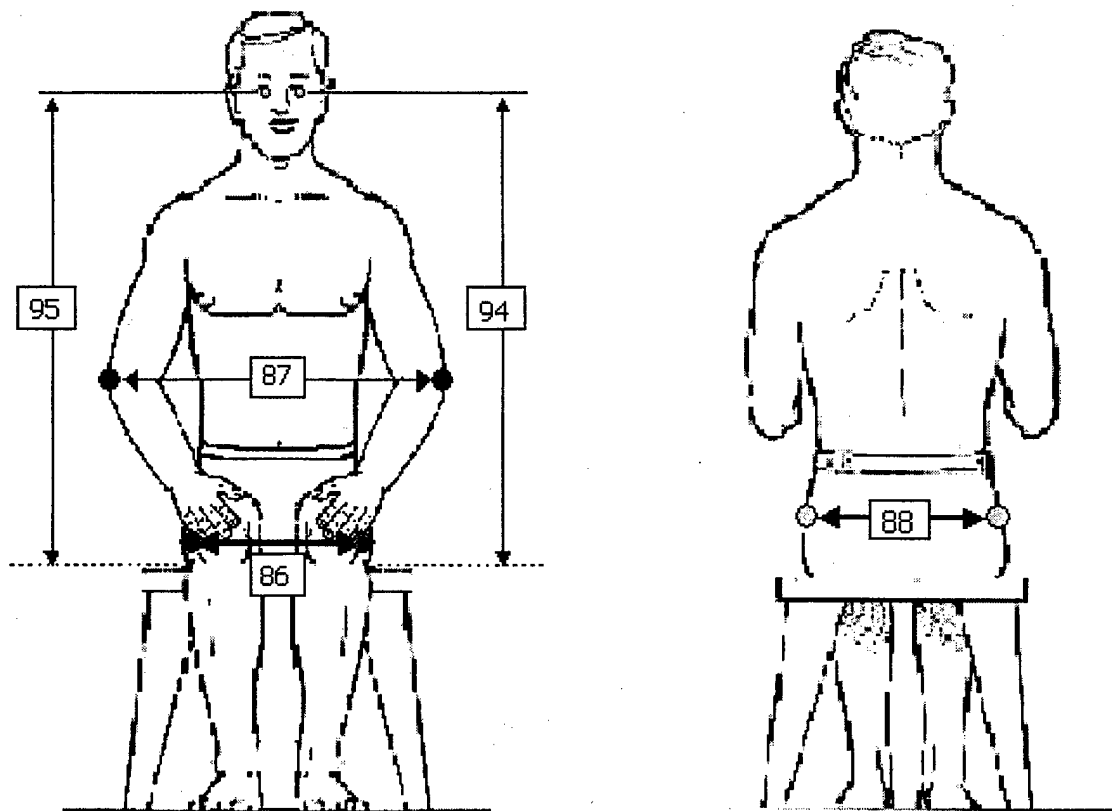


- 52. Bigonial Breadth
- 53. Bitrignon Breadth
- 60. Foot Breadth, Left
- 61. Foot Breadth, Right
- 64. Inter-pupillary Distance
- 70. Malleolus Height, Medial, Left

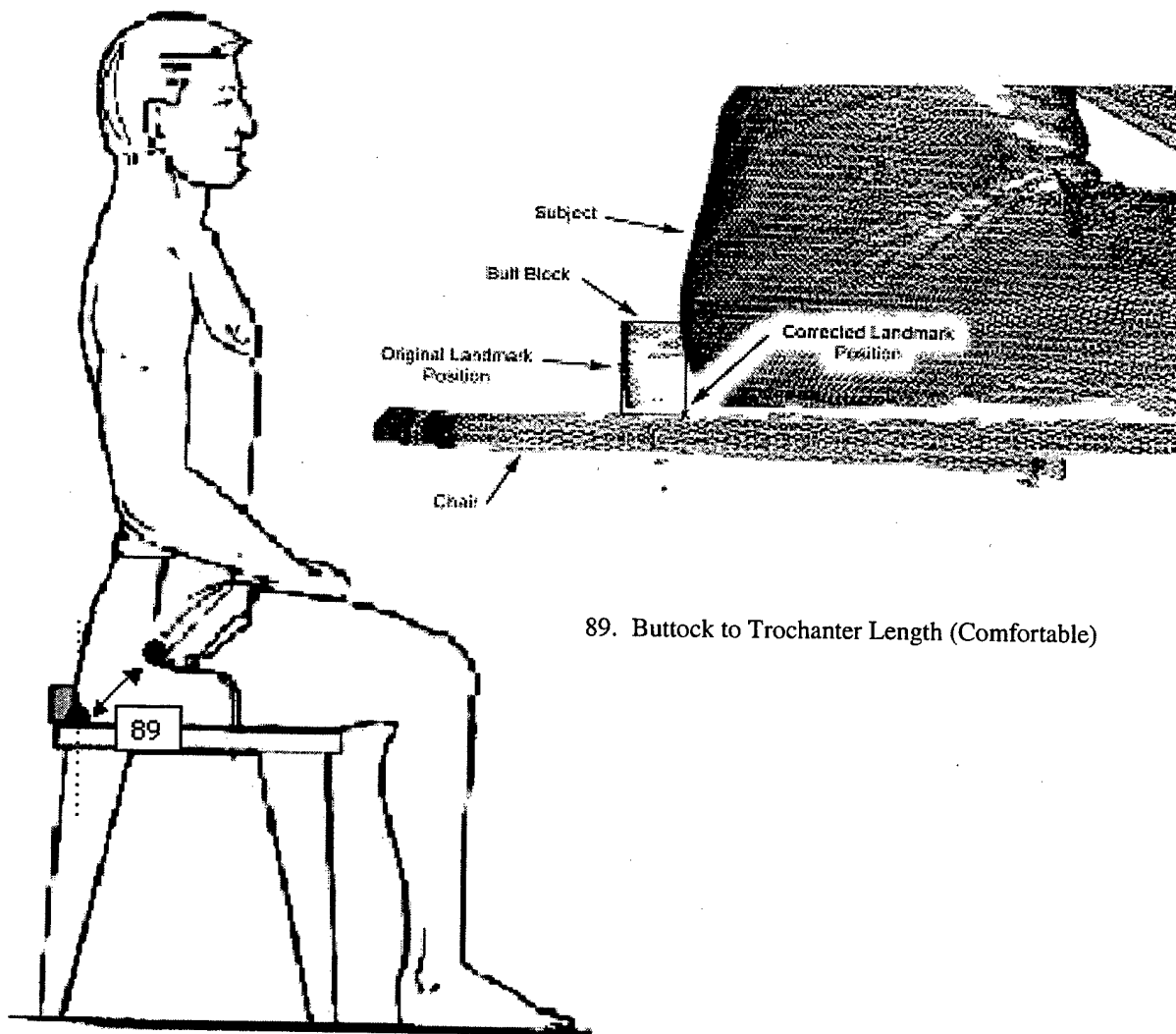
- 71. Malleolus Height, Medial, Right
- 72. Neck Height
- 75. Sellion-Supramenton Length
- 78. Sphyrion Height, Left
- 79. Sphyrion Height, Right



- 84. Acromial Height, Sitting (Comfortable), Left
- 85. Acromial Height, Sitting (Comfortable), Right
- 90. Elbow Height, Sitting (Comfortable), Left
- 91. Elbow Height, Sitting (Comfortable), Right
- 92. Femoral Epicondyle, Lateral, Left to Malleolus, Lateral (Comfortable), Left
- 93. Femoral Epicondyle, Lateral, Right to Malleolus, Lateral (Comfortable), Right
- 96. Trochanter to Femoral Epicondyle, Lateral (Comfortable), Left
- 97. Trochanter to Femoral Epicondyle, Lateral (Comfortable), Right
- 98. Trochanter to Seated Surface (Comfortable), Left
- 99. Trochanter to Seated Surface (Comfortable), Right



- 86. Bi-lateral Femoral Epicondyle Breadth, Sitting (Comfortable)
- 87. Bi-lateral Humeral Epicondyle Breadth, Sitting (Comfortable)
- 88. Bi-Trochanteric Breadth, Sitting (Comfortable)
- 94. Infraorbitale Height, Sitting (Comfortable), Left
- 95. Infraorbitale Height, Sitting (Comfortable), Right



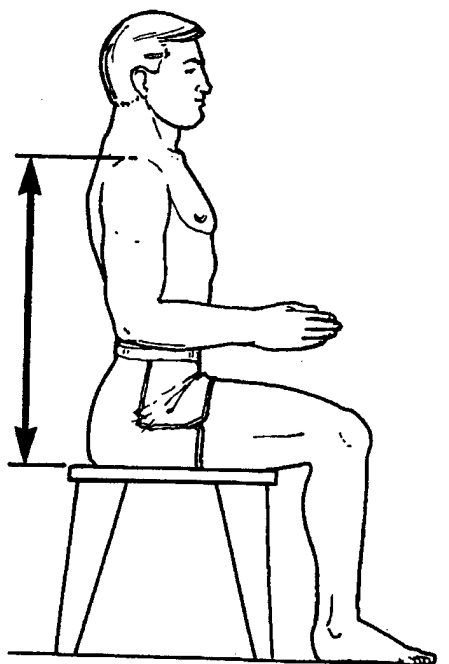
89. Buttock to Trochanter Length (Comfortable)

CHAPTER 5: JSF CAESAR PILOT-SIZE SAMPLE - SUMMARY STATISTICS

This chapter contains the sample size, weighted sample size, mean, minimum and maximum, standard error of the mean (SE Mean), standard deviation (STD), and selected percentiles for both men (N = 646) and women (N = 695). They are reported in both English (in. or lbs) and Metric (mm or kgs) units for: Traditional Measurements (1-40), Standing Scan-Extracted Measurements (41- 83), and Seated Scan-Extracted Measurements (84 - 99). All statistics employing weighted data were analyzed with Stata SE 7.0 (Stata Corporation 2002), while Statistica 5 (Statsoft, Inc. 1998) and Microsoft Excel (2002) were used to organize the data.

1. CAESAR Name: ACROMIAL HEIGHT, SITTING
 ISO Reference No. 4.2.4
 ISO Name: Shoulder Height, Sitting

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	605.63	23.84	566.57	22.31
SE Mean	1.22	0.05	1.07	0.04
STD	31.04	1.22	28.32	1.11
Minimum	512.00	20.16	481.00	18.94
Maximum	702.00	27.64	672.00	26.46



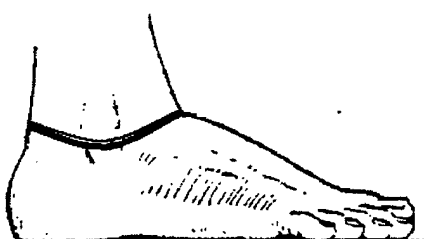
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	530.00	504.00
	2	544.00	509.00
	3	547.00	514.00
	5	556.00	519.00
	10	566.00	530.00
	20	578.00	543.00
	25	584.00	547.00
	50	605.00	566.00
	75	627.00	586.00
	80	631.00	591.00
	90	643.00	603.00
	95	656.00	613.00
	97	665.00	621.00
	98	673.00	624.00
	99	682.00	631.00
English (in)			
	1	20.87	19.84
	2	21.42	20.04
	3	21.54	20.24
	5	21.89	20.43
	10	22.28	20.87
	20	22.76	21.38
	25	22.99	21.54
	50	23.82	22.28
	75	24.69	23.07
	80	24.84	23.27
	90	25.31	23.74
	95	25.83	24.13
	97	26.18	24.45
	98	26.50	24.57
	99	26.85	24.84

2. CAESAR Name: ANKLE CIRCUMFERENCE

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	266.05	10.47	236.22	9.30
SE Mean	0.51	0.02	0.44	0.02
STD	12.88	0.51	11.59	0.46
Minimum	224.00	8.82	202.00	7.95
Maximum	303.00	11.93	283.00	11.14



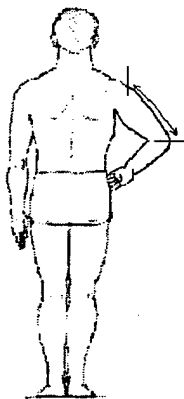
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	237.00	210.00
	2	240.00	214.00
	3	244.00	215.00
	5	246.00	219.00
	10	249.00	222.00
	20	255.00	226.00
	25	257.00	228.00
	50	266.00	235.00
	75	275.00	244.00
	80	278.00	246.00
	90	283.00	251.00
	95	287.00	255.00
	97	289.00	259.00
	98	291.00	261.00
	99	295.00	266.00
English (in)			
	1	9.33	8.27
	2	9.45	8.43
	3	9.61	8.46
	5	9.69	8.62
	10	9.80	8.74
	20	10.04	8.90
	25	10.12	8.98
	50	10.47	9.25
	75	10.83	9.61
	80	10.94	9.69
	90	11.14	9.88
	95	11.30	10.04
	97	11.38	10.20
	98	11.46	10.28
	99	11.61	10.47

3. CAESAR Name: ARM LENGTH (SHOULDER-ELBOW)

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	338.64	13.33	314.14	12.37
SE Mean	0.81	0.03	0.75	0.03
STD	20.57	0.81	19.74	0.78
Minimum	258.00	10.16	257.00	10.12
Maximum	406.00	15.98	427.00	16.81



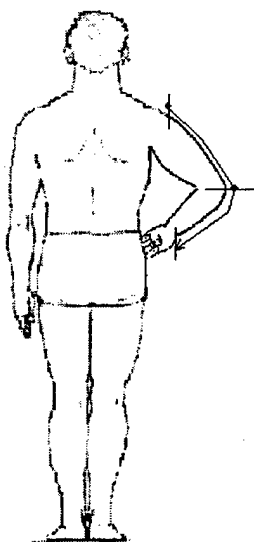
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	292.00	273.00
	2	298.00	279.00
	3	302.00	280.00
	5	307.00	284.00
	10	314.00	290.00
	20	322.00	298.00
	25	325.00	301.00
	50	338.00	313.00
	75	352.00	326.00
	80	356.00	330.00
	90	365.00	338.00
	95	373.00	347.00
	97	376.00	354.00
	98	382.00	355.00
	99	394.00	367.00
English (in)			
	1	11.50	10.75
	2	11.73	10.98
	3	11.89	11.02
	5	12.09	11.18
	10	12.36	11.42
	20	12.68	11.73
	25	12.80	11.85
	50	13.31	12.32
	75	13.86	12.83
	80	14.02	12.99
	90	14.37	13.31
	95	14.69	13.66
	97	14.80	13.94
	98	15.04	13.98
	99	15.51	14.45

4. CAESAR Name: ARM LENGTH (SHOULDER-WRIST)

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	643.02	25.32	584.39	23.01
SE Mean	1.30	0.05	1.20	0.05
STD	33.04	1.30	31.72	1.25
Minimum	552.00	21.73	492.00	19.37
Maximum	754.00	29.69	683.00	26.89



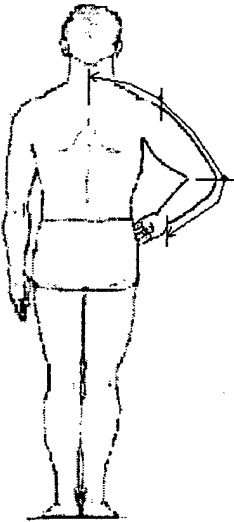
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	571.00	517.00
	2	577.00	525.00
	3	583.00	530.00
	5	591.00	537.00
	10	602.00	545.00
	20	616.00	556.00
	25	620.00	561.00
	50	641.00	582.00
	75	666.00	605.00
	80	673.00	612.00
	90	688.00	626.00
	95	700.00	639.00
	97	706.00	646.00
	98	713.00	659.00
	99	717.00	670.00
English (in)			
	1	22.48	20.35
	2	22.72	20.67
	3	22.95	20.87
	5	23.27	21.14
	10	23.70	21.46
	20	24.25	21.89
	25	24.41	22.09
	50	25.24	22.91
	75	26.22	23.82
	80	26.50	24.09
	90	27.09	24.65
	95	27.56	25.16
	97	27.80	25.43
	98	28.07	25.94
	99	28.23	26.38

5. CAESAR Name: ARM LENGTH (SPINE-WRIST)

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	858.88	33.81	776.74	30.58
SE Mean	1.50	0.06	1.39	0.05
STD	38.16	1.50	36.66	1.44
Minimum	741.00	29.17	693.00	27.28
Maximum	987.00	38.86	891.00	35.08



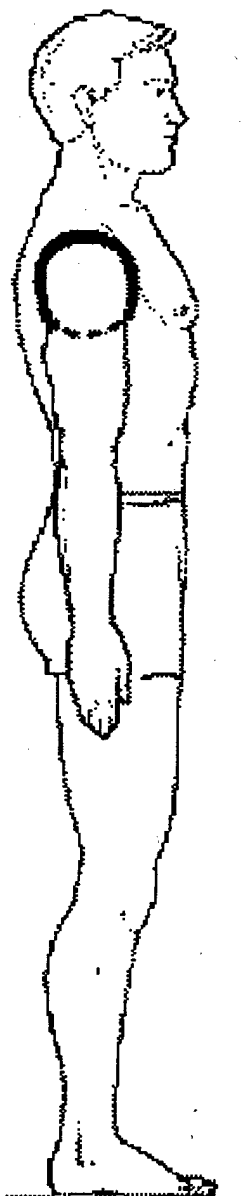
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	773.00	702.00
	2	786.00	710.00
	3	791.00	713.00
	5	798.00	721.00
	10	811.00	730.00
	20	827.00	746.00
	25	832.00	751.00
	50	857.00	774.00
	75	884.00	802.00
	80	891.00	808.00
	90	911.00	824.00
	95	924.00	842.00
	97	932.00	851.00
	98	936.00	860.00
	99	944.00	877.00
English (in)			
	1	30.43	27.64
	2	30.94	27.95
	3	31.14	28.07
	5	31.42	28.39
	10	31.93	28.74
	20	32.56	29.37
	25	32.76	29.57
	50	33.74	30.47
	75	34.80	31.57
	80	35.08	31.81
	90	35.87	32.44
	95	36.38	33.15
	97	36.69	33.50
	98	36.85	33.86
	99	37.17	34.53

6. CAESAR Name: ARMSCYE CIRCUMFERENCE (SCYE CIRCUMFERENCE OVER ACROMION)

ISO Reference No. N/A

ISO Name:

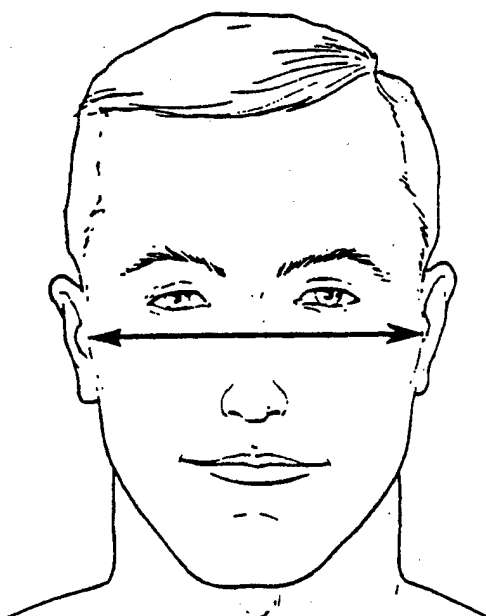
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	437.30	17.22	371.42	14.62
SE Mean	1.14	0.04	0.91	0.04
STD	28.96	1.14	24.04	0.95
Minimum	344.00	13.54	314.00	12.36
Maximum	534.00	21.02	460.00	18.11



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	371.00	323.00
	2	378.00	327.00
	3	383.00	328.00
	5	389.00	332.00
	10	399.00	342.00
	20	414.00	351.00
	25	418.00	355.00
	50	438.00	370.00
	75	456.00	388.00
	80	462.00	391.00
	90	473.00	402.00
	95	485.00	412.00
	97	492.00	417.00
	98	499.00	420.00
	99	506.00	429.00
English (in)			
	1	14.61	12.72
	2	14.88	12.87
	3	15.08	12.91
	5	15.31	13.07
	10	15.71	13.46
	20	16.30	13.82
	25	16.46	13.98
	50	17.24	14.57
	75	17.95	15.28
	80	18.19	15.39
	90	18.62	15.83
	95	19.09	16.22
	97	19.37	16.42
	98	19.65	16.54
	99	19.92	16.89

7. CAESAR Name: BIZYGOMATIC BREADTH
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	141.61	5.58	132.02	5.20
SE Mean	0.23	0.01	0.20	0.01
STD	5.93	0.23	5.37	0.21
Minimum	126.00	4.96	118.00	4.65
Maximum	163.00	6.42	152.00	5.98



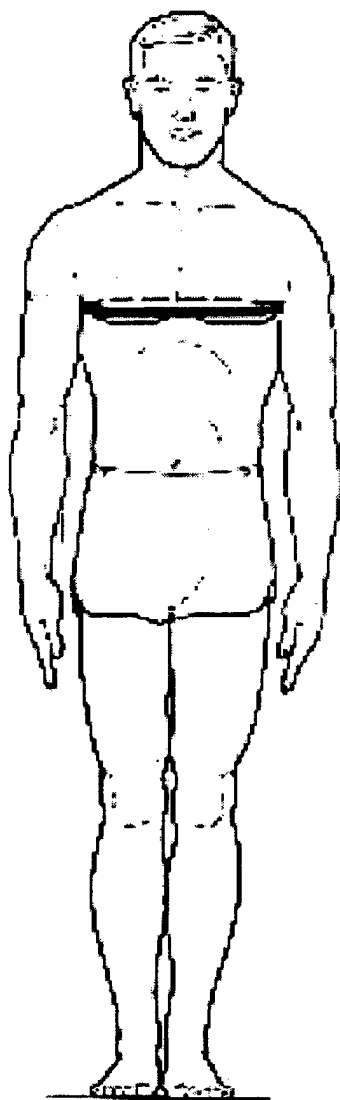
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	128.00	121.00
	2	130.00	122.00
	3	131.00	123.00
	5	132.00	124.00
	10	134.00	125.00
	20	136.00	127.00
	25	137.00	128.00
	50	142.00	132.00
	75	145.00	135.00
	80	146.00	136.00
	90	149.00	139.00
	95	151.00	142.00
	97	153.00	143.00
	98	155.00	143.00
	99	157.00	146.00
English (in)			
	1	5.04	4.76
	2	5.12	4.80
	3	5.16	4.84
	5	5.20	4.88
	10	5.28	4.92
	20	5.35	5.00
	25	5.39	5.04
	50	5.59	5.20
	75	5.71	5.31
	80	5.75	5.35
	90	5.87	5.47
	95	5.94	5.59
	97	6.02	5.63
	98	6.10	5.63
	99	6.18	5.75

8. CAESAR Name: BUST/CHEST CIRCUMFERENCE

ISO Reference No. 4.4.9

ISO Name: Chest Circumference

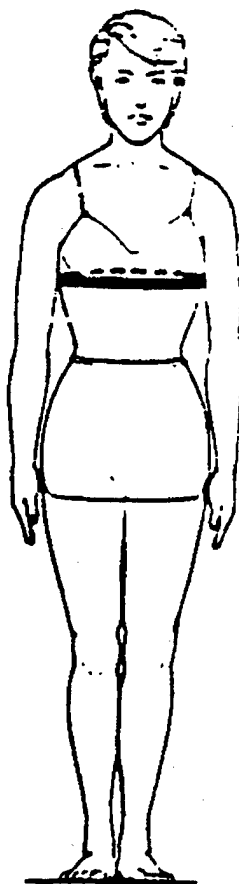
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	999.65	39.36	906.74	35.70
SE Mean	2.69	0.11	2.28	0.09
STD	68.33	2.69	60.23	2.37
Minimum	758.00	29.84	767.00	30.20
Maximum	1173.00	46.18	1093.00	43.03



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	842.00	790.00
	2	851.00	800.00
	3	862.00	804.00
	5	884.00	817.00
	10	910.00	831.00
	20	943.00	849.00
	25	953.00	863.00
	50	1001.00	905.00
	75	1048.00	949.00
	80	1058.00	958.00
	90	1088.00	987.00
	95	1111.00	1014.00
	97	1124.00	1031.00
	98	1135.00	1039.00
	99	1155.00	1045.00
English (in)			
	1	33.15	31.10
	2	33.50	31.50
	3	33.94	31.65
	5	34.80	32.17
	10	35.83	32.72
	20	37.13	33.43
	25	37.52	33.98
	50	39.41	35.63
	75	41.26	37.36
	80	41.65	37.72
	90	42.83	38.86
	95	43.74	39.92
	97	44.25	40.59
	98	44.69	40.91
	99	45.47	41.14

9. CAESAR Name: BUST/CHEST CIRCUMFERENCE UNDER BUST
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	.	.	695.00	695.00
Weighted Size	.	.	693.26	693.26
Mean	.	.	760.22	29.93
SE Mean	.	.	1.66	0.07
STD	.	.	43.66	1.72
Minimum	.	.	669.00	26.34
Maximum	.	.	973.00	38.31



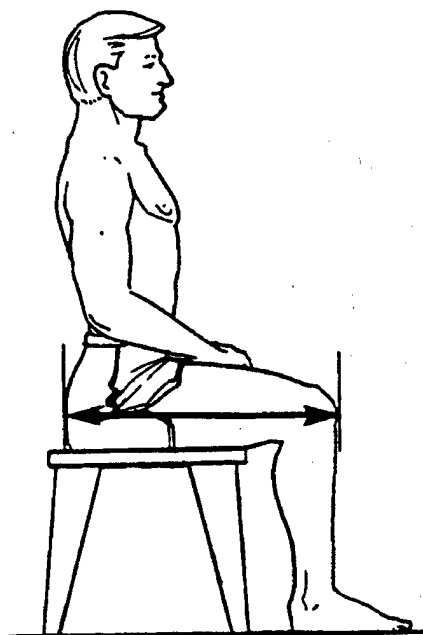
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	.	677.00
	2	.	683.00
	3	.	685.00
	5	.	691.00
	10	.	706.00
	20	.	722.00
	25	.	728.00
	50	.	756.00
	75	.	787.00
	80	.	795.00
	90	.	817.00
	95	.	841.00
	97	.	853.00
	98	.	856.00
	99	.	867.00
English (in)			
	1	.	26.65
	2	.	26.89
	3	.	26.97
	5	.	27.20
	10	.	27.80
	20	.	28.43
	25	.	28.66
	50	.	29.76
	75	.	30.98
	80	.	31.30
	90	.	32.17
	95	.	33.11
	97	.	33.58
	98	.	33.70
	99	.	34.13

10. CAESAR Name: BUTTOCK-KNEE LENGTH, RIGHT

ISO Reference No. 4.4.7

ISO Name: Buttock-Knee Length

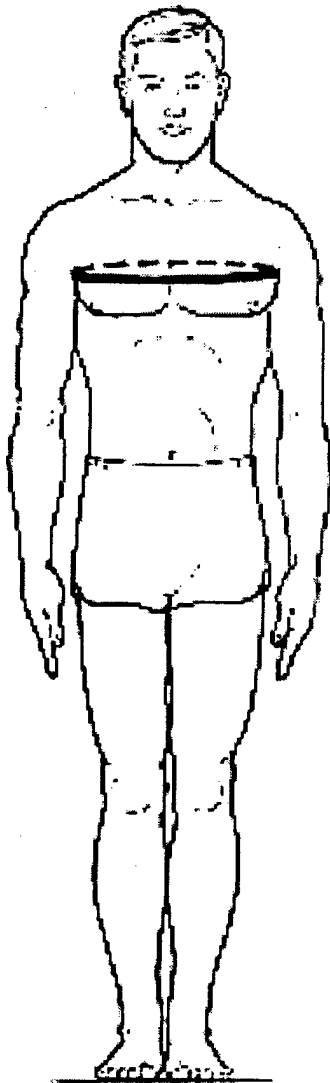
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	613.97	24.17	582.62	22.94
SE Mean	1.20	0.05	1.12	0.04
STD	30.49	1.20	29.60	1.17
Minimum	522.00	20.55	507.00	19.96
Maximum	709.00	27.91	673.00	26.50



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	548.00	523.00
	2	555.00	528.00
	3	559.00	531.00
	5	564.00	538.00
	10	577.00	547.00
	20	588.00	556.00
	25	593.00	562.00
	50	613.00	580.00
	75	634.00	601.00
	80	639.00	607.00
	90	655.00	624.00
	95	668.00	636.00
	97	674.00	643.00
	98	678.00	648.00
	99	688.00	653.00
English (in)			
	1	21.57	20.59
	2	21.85	20.79
	3	22.01	20.91
	5	22.20	21.18
	10	22.72	21.54
	20	23.15	21.89
	25	23.35	22.13
	50	24.13	22.83
	75	24.96	23.66
	80	25.16	23.90
	90	25.79	24.57
	95	26.30	25.04
	97	26.54	25.31
	98	26.69	25.51
	99	27.09	25.71

11. CAESAR Name: CHEST GIRTH (CHEST CIRCUMFERENCE AT SCYE)
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	1023.44	40.29	881.08	34.69
SE Mean	2.62	0.10	1.97	0.08
STD	66.69	2.63	51.91	2.04
Minimum	817.00	32.17	756.00	29.76
Maximum	1234.00	48.58	1076.00	42.36



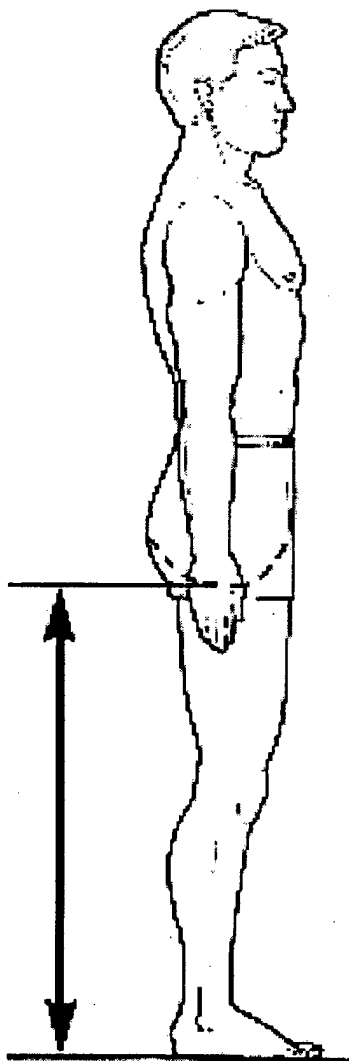
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	856.00	778.00
	2	879.00	785.00
	3	896.00	797.00
	5	911.00	805.00
	10	939.00	816.00
	20	969.00	835.00
	25	981.00	842.00
	50	1021.00	876.00
	75	1069.00	917.00
	80	1080.00	926.00
	90	1109.00	951.00
	95	1132.00	971.00
	97	1147.00	983.00
	98	1159.00	990.00
	99	1171.00	1002.00
English (in)			
	1	33.70	30.63
	2	34.61	30.91
	3	35.28	31.38
	5	35.87	31.69
	10	36.97	32.13
	20	38.15	32.87
	25	38.62	33.15
	50	40.20	34.49
	75	42.09	36.10
	80	42.52	36.46
	90	43.66	37.44
	95	44.57	38.23
	97	45.16	38.70
	98	45.63	38.98
	99	46.10	39.45

12. CAESAR Name: CROTCH HEIGHT

ISO Reference No. 4.1.7

ISO Name: Crotch Height

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	694.00	694.00
Weighted Size	644.70	644.70	692.32	692.32
Mean	808.32	31.82	758.42	29.86
SE Mean	1.93	0.08	1.69	0.07
STD	48.98	1.93	44.50	1.75
Minimum	665.00	26.18	648.00	25.51
Maximum	962.00	37.87	910.00	35.83



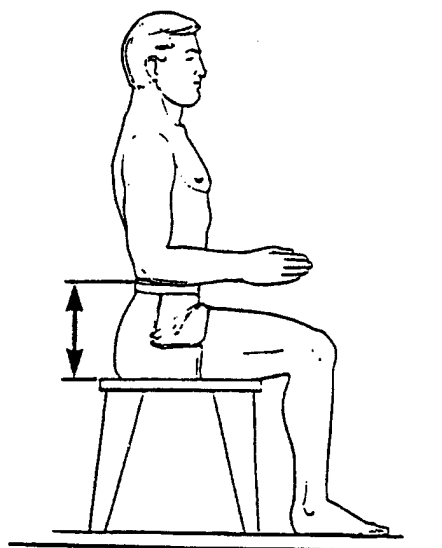
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	697.00	666.00
	2	709.00	674.00
	3	721.00	678.00
	5	728.00	688.00
	10	751.00	703.00
	20	764.00	721.00
	25	773.00	727.00
	50	807.00	758.00
	75	839.00	789.00
	80	849.00	796.00
	90	874.00	814.00
	95	891.00	836.00
	97	906.00	847.00
	98	915.00	855.00
	99	928.00	865.00
English (in)			
	1	27.44	26.22
	2	27.91	26.54
	3	28.39	26.69
	5	28.66	27.09
	10	29.57	27.68
	20	30.08	28.39
	25	30.43	28.62
	50	31.77	29.84
	75	33.03	31.06
	80	33.43	31.34
	90	34.41	32.05
	95	35.08	32.91
	97	35.67	33.35
	98	36.02	33.66
	99	36.54	34.06

13. CAESAR Name: ELBOW HEIGHT, SITTING, RIGHT

ISO Reference No. 4.2.5

ISO Name: Elbow Height, Sitting

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	240.07	9.45	233.58	9.20
SE Mean	0.99	0.04	0.97	0.04
STD	25.26	0.99	25.58	1.01
Minimum	144.00	5.67	145.00	5.71
Maximum	310.00	12.20	304.00	11.97



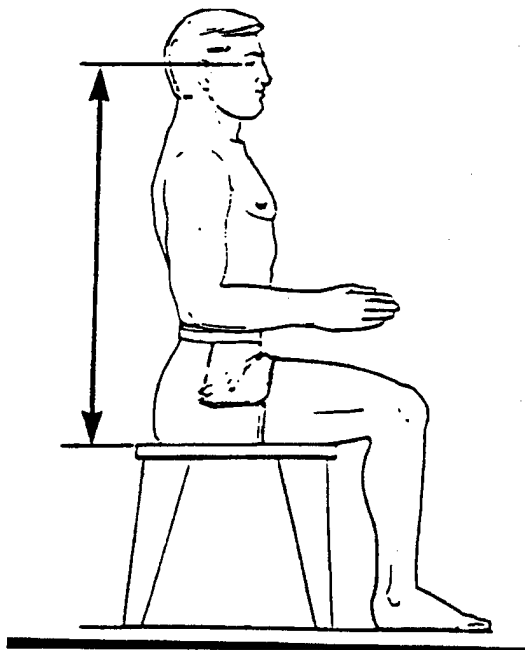
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	177.00	170.00
	2	186.00	174.00
	3	189.00	181.00
	5	197.00	192.00
	10	209.00	202.00
	20	219.00	212.00
	25	223.00	216.00
	50	240.00	235.00
	75	257.00	251.00
	80	261.00	255.00
	90	272.00	266.00
	95	281.00	276.00
	97	287.00	280.00
	98	289.00	282.00
	99	299.00	293.00
English (in)			
	1	6.97	6.69
	2	7.32	6.85
	3	7.44	7.13
	5	7.76	7.56
	10	8.23	7.95
	20	8.62	8.35
	25	8.78	8.50
	50	9.45	9.25
	75	10.12	9.88
	80	10.28	10.04
	90	10.71	10.47
	95	11.06	10.87
	97	11.30	11.02
	98	11.38	11.10
	99	11.77	11.54

14. CAESAR Name: EYE HEIGHT, SITTING, RIGHT

ISO Reference No. 4.2.2

ISO Name: Eye Height, Sitting

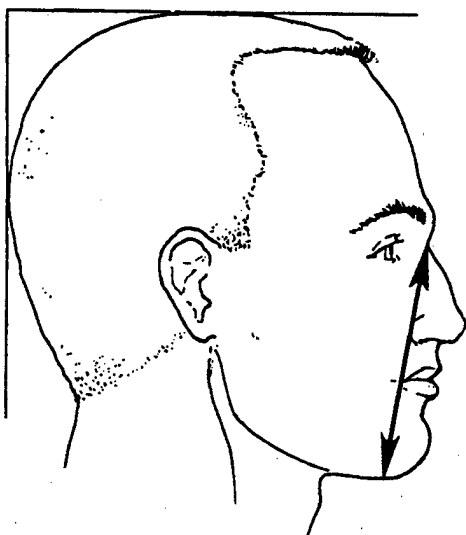
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	694.00	694.00
Weighted Size	644.70	644.70	692.32	692.32
Mean	812.60	31.99	756.75	29.79
SE Mean	1.46	0.06	1.26	0.05
STD	37.11	1.46	33.31	1.31
Minimum	711.00	27.99	662.00	26.06
Maximum	913.00	35.94	871.00	34.29



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	727.00	672.00
	2	735.00	685.00
	3	742.00	694.00
	5	755.00	704.00
	10	765.00	714.00
	20	781.00	730.00
	25	787.00	735.00
	50	813.00	757.00
	75	838.00	780.00
	80	845.00	786.00
	90	861.00	800.00
	95	876.00	810.00
	97	884.00	819.00
	98	891.00	823.00
	99	900.00	835.00
English (in)			
	1	28.62	26.46
	2	28.94	26.97
	3	29.21	27.32
	5	29.72	27.72
	10	30.12	28.11
	20	30.75	28.74
	25	30.98	28.94
	50	32.01	29.80
	75	32.99	30.71
	80	33.27	30.94
	90	33.90	31.50
	95	34.49	31.89
	97	34.80	32.24
	98	35.08	32.40
	99	35.43	32.87

15. CAESAR Name: FACE LENGTH (MENTON-SELLION LENGTH)
 ISO Reference No. 4.3.11
 ISO Name: Face Length (Nasion-Menton)

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	694.00	694.00
Weighted Size	644.70	644.70	692.32	692.32
Mean	121.45	4.78	111.67	4.40
SE Mean	0.29	0.01	0.24	0.01
STD	7.29	0.29	6.24	0.25
Minimum	99.00	3.90	76.00	2.99
Maximum	152.00	5.98	129.00	5.08



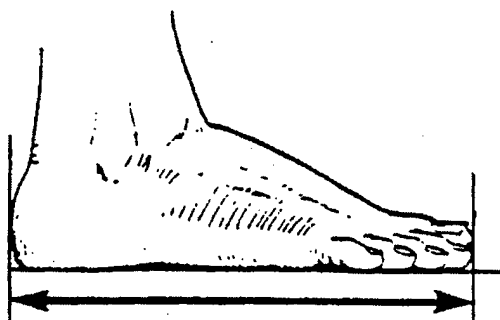
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	105.00	98.00
	2	107.00	99.00
	3	110.00	101.00
	5	111.00	102.00
	10	113.00	104.00
	20	115.00	106.00
	25	116.00	107.00
	50	121.00	112.00
	75	126.00	116.00
	80	127.00	117.00
	90	131.00	120.00
	95	134.00	122.00
	97	137.00	123.00
	98	139.00	124.00
	99	141.00	125.00
English (in)			
	1	4.13	3.86
	2	4.21	3.90
	3	4.33	3.98
	5	4.37	4.02
	10	4.45	4.09
	20	4.53	4.17
	25	4.57	4.21
	50	4.76	4.41
	75	4.96	4.57
	80	5.00	4.61
	90	5.16	4.72
	95	5.28	4.80
	97	5.39	4.84
	98	5.47	4.88
	99	5.55	4.92

16. CAESAR Name: FOOT LENGTH, RIGHT

ISO Reference No. 4.3.7

ISO Name: Foot Length

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	267.79	10.54	238.71	9.40
SE Mean	0.55	0.02	0.45	0.02
STD	13.92	0.55	11.90	0.47
Minimum	215.00	8.46	201.00	7.91
Maximum	309.00	12.17	281.00	11.06



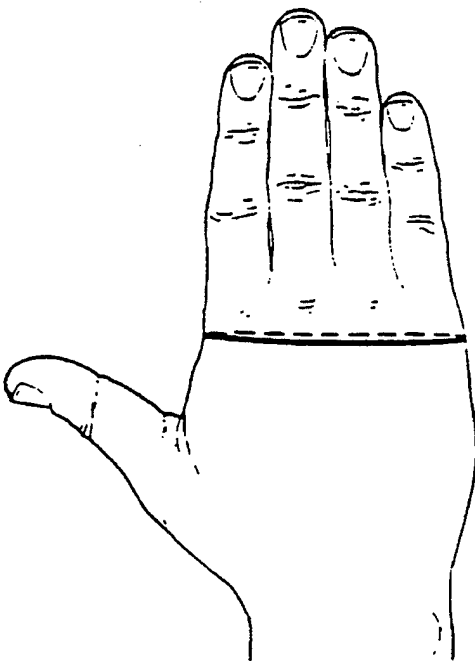
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	237.00	213.00
	2	241.00	216.00
	3	243.00	219.00
	5	245.00	221.00
	10	251.00	224.00
	20	257.00	229.00
	25	258.00	230.00
	50	267.00	238.00
	75	277.00	247.00
	80	280.00	249.00
	90	286.00	254.00
	95	291.00	259.00
	97	296.00	262.00
	98	298.00	264.00
	99	305.00	272.00
English (in)			
	1	9.33	8.39
	2	9.49	8.50
	3	9.57	8.62
	5	9.65	8.70
	10	9.88	8.82
	20	10.12	9.02
	25	10.16	9.06
	50	10.51	9.37
	75	10.91	9.72
	80	11.02	9.80
	90	11.26	10.00
	95	11.46	10.20
	97	11.65	10.31
	98	11.73	10.39
	99	12.01	10.71

17. CAESAR Name: HAND CIRCUMFERENCE, RIGHT

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	210.76	8.30	182.88	7.20
SE Mean	0.40	0.02	0.35	0.01
STD	10.18	0.40	9.23	0.36
Minimum	179.00	7.05	155.00	6.10
Maximum	237.00	9.33	211.00	8.31



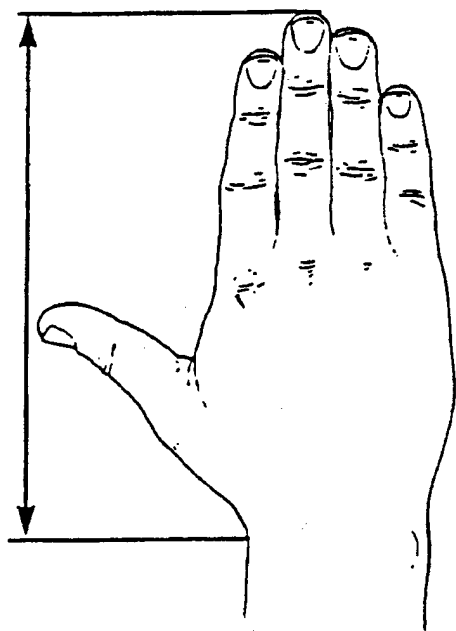
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	188.00	162.00
	2	191.00	165.00
	3	192.00	166.00
	5	194.00	167.00
	10	197.00	171.00
	20	202.00	175.00
	25	204.00	177.00
	50	211.00	183.00
	75	218.00	189.00
	80	220.00	190.00
	90	224.00	195.00
	95	227.00	198.00
	97	231.00	201.00
	98	232.00	203.00
	99	234.00	205.00
English (in)			
	1	7.40	6.38
	2	7.52	6.50
	3	7.56	6.54
	5	7.64	6.57
	10	7.76	6.73
	20	7.95	6.89
	25	8.03	6.97
	50	8.31	7.20
	75	8.58	7.44
	80	8.66	7.48
	90	8.82	7.68
	95	8.94	7.80
	97	9.09	7.91
	98	9.13	7.99
	99	9.21	8.07

18. CAESAR Name: HAND LENGTH, RIGHT

ISO Reference No. 4.3.1

ISO Name: Hand Length

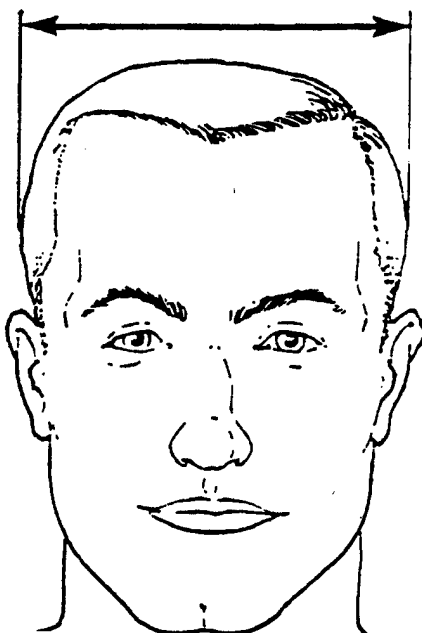
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	202.95	7.99	182.39	7.18
SE Mean	0.40	0.02	0.39	0.02
STD	10.10	0.40	10.25	0.40
Minimum	170.00	6.69	118.00	4.65
Maximum	233.00	9.17	216.00	8.50



		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	179.00	162.00
	2	183.00	164.00
	3	184.00	166.00
	5	187.00	168.00
	10	191.00	170.00
	20	195.00	174.00
	25	196.00	175.00
	50	203.00	182.00
	75	210.00	189.00
	80	211.00	191.00
	90	216.00	195.00
	95	220.00	200.00
	97	222.00	204.00
	98	224.00	206.00
	99	228.00	209.00
English (in)			
	1	7.05	6.38
	2	7.20	6.46
	3	7.24	6.54
	5	7.36	6.61
	10	7.52	6.69
	20	7.68	6.85
	25	7.72	6.89
	50	7.99	7.17
	75	8.27	7.44
	80	8.31	7.52
	90	8.50	7.68
	95	8.66	7.87
	97	8.74	8.03
	98	8.82	8.11
	99	8.98	8.23

19. CAESAR Name: HEAD BREADTH
 ISO Reference No. 4.3.10
 ISO Name: Head Breadth

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	694.00	694.00
Weighted Size	644.70	644.70	691.60	691.60
Mean	153.84	6.06	145.53	5.73
SE Mean	0.22	0.01	0.19	0.01
STD	5.59	0.22	5.04	0.20
Minimum	138.00	5.43	131.00	5.16
Maximum	175.00	6.89	170.00	6.69



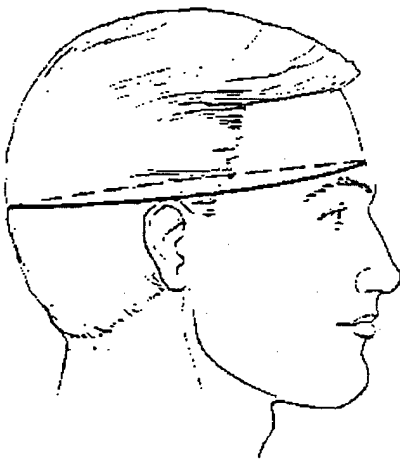
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)	1	142.00	134.00
	2	143.00	135.00
	3	144.00	136.00
	5	145.00	137.00
	10	146.00	140.00
	20	149.00	142.00
	25	150.00	142.00
	50	154.00	145.00
	75	157.00	148.00
	80	158.00	149.00
	90	161.00	152.00
	95	163.00	154.00
	97	165.00	156.00
	98	166.00	158.00
	99	168.00	160.00
English (in)	1	5.59	5.28
	2	5.63	5.31
	3	5.67	5.35
	5	5.71	5.39
	10	5.75	5.51
	20	5.87	5.59
	25	5.91	5.59
	50	6.06	5.71
	75	6.18	5.83
	80	6.22	5.87
	90	6.34	5.98
	95	6.42	6.06
	97	6.50	6.14
	98	6.54	6.22
	99	6.61	6.30

20. CAESAR Name: HEAD CIRCUMFERENCE

ISO Reference No. 4.3.12

ISO Name: Head Circumference

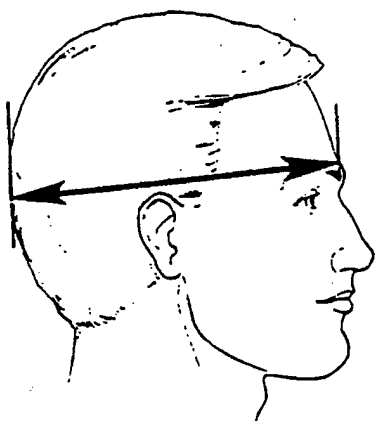
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	694.00	694.00
Weighted Size	644.70	644.70	691.60	691.60
Mean	576.60	22.70	550.04	21.65
SE Mean	0.59	0.02	0.59	0.02
STD	14.93	0.59	15.64	0.62
Minimum	528.00	20.79	494.00	19.45
Maximum	617.00	24.29	614.00	24.17



		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	544.00	520.00
	2	548.00	522.00
	3	549.00	523.00
	5	553.00	525.00
	10	557.00	531.00
	20	563.00	537.00
	25	566.00	539.00
	50	576.00	550.00
	75	587.00	560.00
	80	589.00	563.00
	90	595.00	571.00
	95	601.00	576.00
	97	605.00	581.00
	98	608.00	585.00
	99	611.00	590.00
English (in)			
	1	21.42	20.47
	2	21.57	20.55
	3	21.61	20.59
	5	21.77	20.67
	10	21.93	20.91
	20	22.17	21.14
	25	22.28	21.22
	50	22.68	21.65
	75	23.11	22.05
	80	23.19	22.17
	90	23.43	22.48
	95	23.66	22.68
	97	23.82	22.87
	98	23.94	23.03
	99	24.06	23.23

21. CAESAR Name: HEAD LENGTH
 ISO Reference No. 4.3.9
 ISO Name: Head Length

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	694.00	694.00
Weighted Size	644.70	644.70	691.60	691.60
Mean	200.39	7.89	188.27	7.41
SE Mean	0.28	0.01	0.26	0.01
STD	7.11	0.28	6.89	0.27
Minimum	143.00	5.63	166.00	6.54
Maximum	219.00	8.62	206.00	8.11



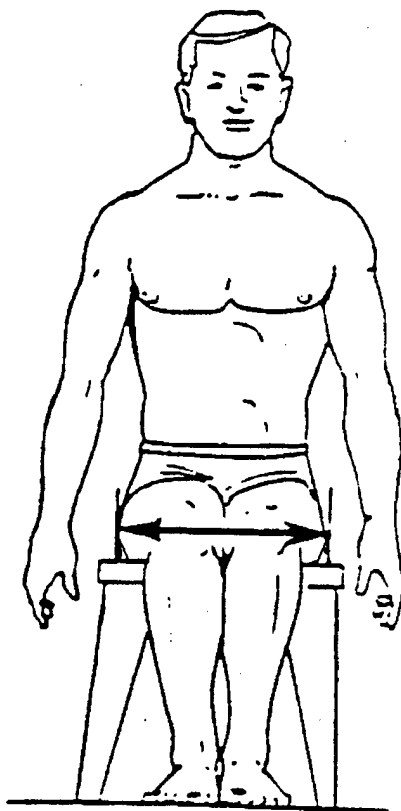
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	183.00	171.00
	2	184.00	174.00
	3	186.00	175.00
	5	188.00	177.00
	10	192.00	180.00
	20	195.00	182.00
	25	196.00	184.00
	50	201.00	188.00
	75	205.00	193.00
	80	206.00	194.00
	90	210.00	197.00
	95	212.00	199.00
	97	213.00	201.00
	98	214.00	202.00
	99	215.00	203.00
English (in)			
	1	7.20	6.73
	2	7.24	6.85
	3	7.32	6.89
	5	7.40	6.97
	10	7.56	7.09
	20	7.68	7.17
	25	7.72	7.24
	50	7.91	7.40
	75	8.07	7.60
	80	8.11	7.64
	90	8.27	7.76
	95	8.35	7.83
	97	8.39	7.91
	98	8.43	7.95
	99	8.46	7.99

22. CAESAR Name: HIP BREADTH, SITTING

ISO Reference No. 4.2.11

ISO Name: Hip Breadth, Sitting

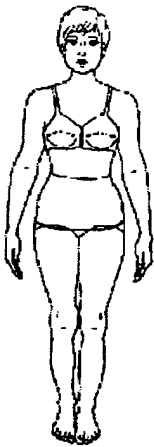
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	370.52	14.59	394.23	15.52
SE Mean	0.94	0.04	1.08	0.04
STD	23.86	0.94	28.43	1.12
Minimum	304.00	11.97	324.00	12.76
Maximum	455.00	17.91	493.00	19.41



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	314.00	334.00
	2	321.00	343.00
	3	326.00	347.00
	5	330.00	350.00
	10	339.00	359.00
	20	351.00	370.00
	25	355.00	374.00
	50	370.00	392.00
	75	387.00	414.00
	80	391.00	417.00
	90	402.00	433.00
	95	410.00	442.00
	97	415.00	449.00
	98	417.00	457.00
	99	425.00	466.00
English (in)			
	1	12.36	13.15
	2	12.64	13.50
	3	12.83	13.66
	5	12.99	13.78
	10	13.35	14.13
	20	13.82	14.57
	25	13.98	14.72
	50	14.57	15.43
	75	15.24	16.30
	80	15.39	16.42
	90	15.83	17.05
	95	16.14	17.40
	97	16.34	17.68
	98	16.42	17.99
	99	16.73	18.35

23. CAESAR Name: HIP CIRCUMFERENCE, MAXIMUM
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	693.00	693.00
Weighted Size	644.70	644.70	691.38	691.38
Mean	1014.90	39.96	1011.38	39.82
SE Mean	2.24	0.09	2.38	0.09
STD	56.92	2.24	62.54	2.46
Minimum	829.00	32.64	839.00	33.03
Maximum	1171.00	46.10	1200.00	47.24



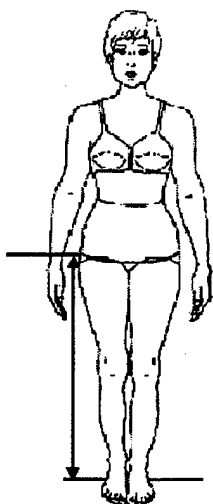
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	883.00	887.00
	2	897.00	895.00
	3	909.00	904.00
	5	923.00	914.00
	10	942.00	933.00
	20	962.00	958.00
	25	973.00	966.00
	50	1017.00	1006.00
	75	1056.00	1054.00
	80	1062.00	1065.00
	90	1087.00	1095.00
	95	1109.00	1121.00
	97	1118.00	1134.00
	98	1127.00	1140.00
	99	1135.00	1161.00
English (in)			
	1	34.76	34.92
	2	35.31	35.24
	3	35.79	35.59
	5	36.34	35.98
	10	37.09	36.73
	20	37.87	37.72
	25	38.31	38.03
	50	40.04	39.61
	75	41.57	41.50
	80	41.81	41.93
	90	42.80	43.11
	95	43.66	44.13
	97	44.02	44.65
	98	44.37	44.88
	99	44.69	45.71

24. CAESAR Name: HIP CIRCUMFERENCE, MAXIMUM, HEIGHT

ISO Reference No. N/A

ISO Name:

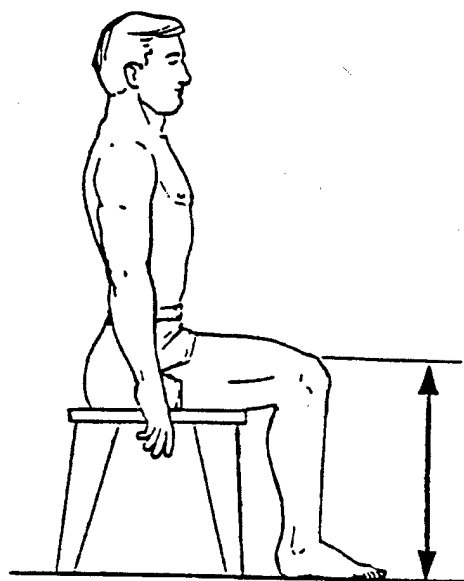
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	693.00	693.00
Weighted Size	644.70	644.70	691.38	691.38
Mean	884.65	34.83	807.32	31.78
SE Mean	2.13	0.08	1.86	0.07
STD	54.09	2.13	48.93	1.93
Minimum	733.00	28.86	691.00	27.20
Maximum	1065.00	41.93	1032.00	40.63



		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	773.00	712.00
	2	778.00	723.00
	3	786.00	726.00
	5	799.00	734.00
	10	815.00	749.00
	20	842.00	766.00
	25	849.00	772.00
	50	881.00	804.00
	75	920.00	839.00
	80	931.00	845.00
	90	955.00	867.00
	95	973.00	893.00
	97	990.00	908.00
	98	1009.00	925.00
	99	1037.00	945.00
English (in)			
	1	30.43	28.03
	2	30.63	28.46
	3	30.94	28.58
	5	31.46	28.90
	10	32.09	29.49
	20	33.15	30.16
	25	33.43	30.39
	50	34.69	31.65
	75	36.22	33.03
	80	36.65	33.27
	90	37.60	34.13
	95	38.31	35.16
	97	38.98	35.75
	98	39.72	36.42
	99	40.83	37.20

25. CAESAR Name: KNEE HEIGHT, SITTING, RIGHT
ISO Reference No. 4.2.14
ISO Name: Knee Height

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	561.44	22.10	510.62	20.10
SE Mean	1.17	0.05	1.01	0.04
STD	29.73	1.17	26.60	1.05
Minimum	475.00	18.70	445.00	17.52
Maximum	657.00	25.87	609.00	23.98



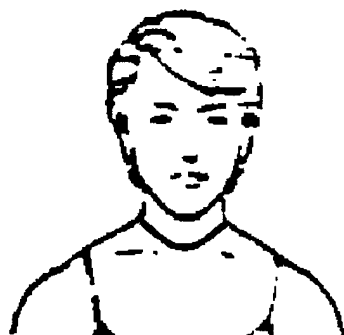
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	493.00	459.00
	2	504.00	461.00
	3	508.00	465.00
	5	514.00	471.00
	10	526.00	478.00
	20	536.00	488.00
	25	541.00	491.00
	50	560.00	509.00
	75	582.00	527.00
	80	587.00	532.00
	90	598.00	547.00
	95	609.00	556.00
	97	623.00	567.00
	98	632.00	570.00
	99	640.00	580.00
English (in)			
	1	19.41	18.07
	2	19.84	18.15
	3	20.00	18.31
	5	20.24	18.54
	10	20.71	18.82
	20	21.10	19.21
	25	21.30	19.33
	50	22.05	20.04
	75	22.91	20.75
	80	23.11	20.94
	90	23.54	21.54
	95	23.98	21.89
	97	24.53	22.32
	98	24.88	22.44
	99	25.20	22.83

26. CAESAR Name: NECK BASE CIRCUMFERENCE

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	460.89	18.15	403.92	15.90
SE Mean	0.90	0.04	0.76	0.03
STD	22.84	0.90	20.06	0.79
Minimum	387.00	15.24	344.00	13.54
Maximum	538.00	21.18	481.00	18.94



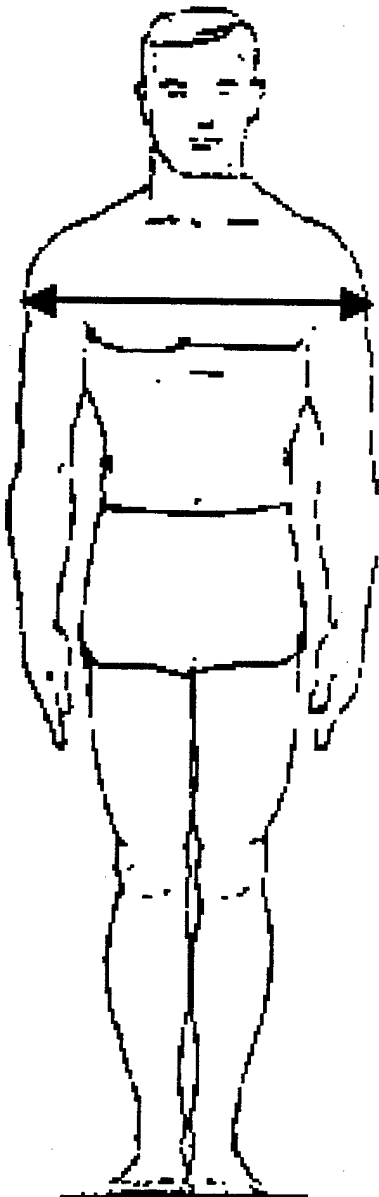
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	411.00	363.00
	2	418.00	367.00
	3	422.00	370.00
	5	426.00	373.00
	10	432.00	380.00
	20	441.00	387.00
	25	445.00	390.00
	50	460.00	403.00
	75	477.00	417.00
	80	482.00	421.00
	90	490.00	430.00
	95	499.00	439.00
	97	503.00	443.00
	98	509.00	444.00
	99	516.00	451.00
English (in)			
	1	16.18	14.29
	2	16.46	14.45
	3	16.61	14.57
	5	16.77	14.69
	10	17.01	14.96
	20	17.36	15.24
	25	17.52	15.35
	50	18.11	15.87
	75	18.78	16.42
	80	18.98	16.57
	90	19.29	16.93
	95	19.65	17.28
	97	19.80	17.44
	98	20.04	17.48
	99	20.31	17.76

27. CAESAR Name: SHOULDER BREADTH, (BIDELTOID)

ISO Reference No. 4.2.9

ISO Name: Shoulder (Bideltoid) Breadth

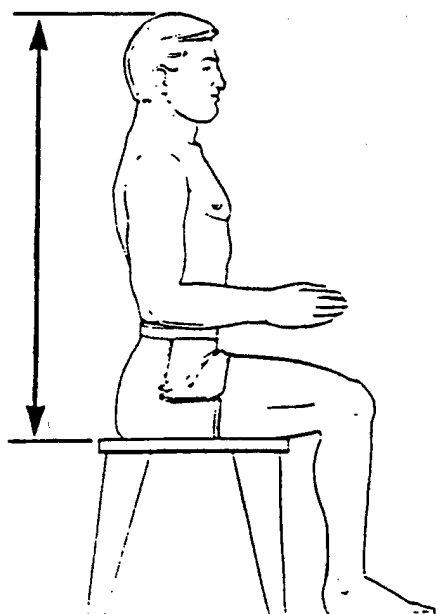
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	487.28	19.18	420.83	16.57
SE Mean	1.06	0.04	0.81	0.03
STD	26.84	1.06	21.47	0.85
Minimum	407.00	16.02	360.00	14.17
Maximum	561.00	22.09	490.00	19.29



		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	425.00	377.00
	2	434.00	382.00
	3	436.00	384.00
	5	443.00	387.00
	10	452.00	394.00
	20	463.00	402.00
	25	467.00	407.00
	50	487.00	419.00
	75	506.00	436.00
	80	511.00	439.00
	90	522.00	450.00
	95	529.00	459.00
	97	534.00	464.00
	98	539.00	468.00
	99	547.00	473.00
English (in)			
	1	16.73	14.84
	2	17.09	15.04
	3	17.17	15.12
	5	17.44	15.24
	10	17.80	15.51
	20	18.23	15.83
	25	18.39	16.02
	50	19.17	16.50
	75	19.92	17.17
	80	20.12	17.28
	90	20.55	17.72
	95	20.83	18.07
	97	21.02	18.27
	98	21.22	18.43
	99	21.54	18.62

28. CAESAR Name: SITTING HEIGHT
 ISO Reference No. 4.2.1
 ISO Name: Sitting Height (Erect)

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	930.34	36.63	867.33	34.15
SE Mean	1.50	0.06	1.34	0.05
STD	38.14	1.50	35.34	1.39
Minimum	821.00	32.32	771.00	30.35
Maximum	1035.00	40.75	977.00	38.46



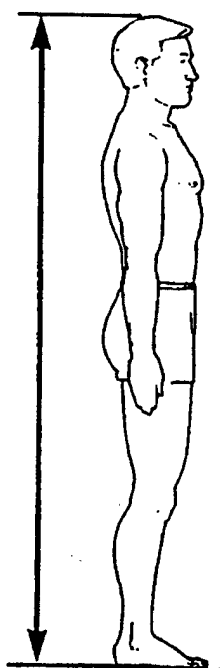
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	846.00	783.00
	2	855.00	794.00
	3	859.00	801.00
	5	866.00	810.00
	10	880.00	822.00
	20	899.00	840.00
	25	904.00	845.00
	50	932.00	866.00
	75	955.00	894.00
	80	963.50	899.00
	90	979.00	914.00
	95	994.00	923.00
	97	1004.00	935.00
	98	1013.00	939.00
	99	1021.00	953.00
English (in)			
	1	33.31	30.83
	2	33.66	31.26
	3	33.82	31.54
	5	34.09	31.89
	10	34.65	32.36
	20	35.39	33.07
	25	35.59	33.27
	50	36.69	34.09
	75	37.60	35.20
	80	37.93	35.39
	90	38.54	35.98
	95	39.13	36.34
	97	39.53	36.81
	98	39.88	36.97
	99	40.20	37.52

29. CAESAR Name: STATURE

ISO Reference No. 4.1.2

ISO Name: Stature (Body Height)

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	1783.30	70.21	1647.23	64.85
SE Mean	3.01	0.12	2.63	0.10
STD	76.40	3.01	69.28	2.73
Minimum	1566.00	61.65	1466.00	57.72
Maximum	2001.00	78.78	1879.00	73.98



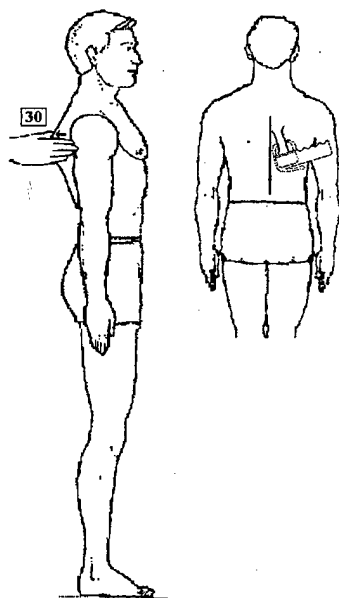
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1620.00	1498.00
	2	1626.00	1509.00
	3	1637.00	1518.00
	5	1667.00	1537.00
	10	1689.00	1560.00
	20	1719.00	1586.00
	25	1730.00	1601.00
	50	1780.00	1644.00
	75	1832.00	1692.00
	80	1845.00	1704.00
	90	1883.00	1740.00
	95	1917.00	1768.00
	97	1940.00	1778.00
	98	1964.00	1791.00
	99	1980.00	1809.00
English (in)			
	1	63.78	58.98
	2	64.02	59.41
	3	64.45	59.76
	5	65.63	60.51
	10	66.50	61.42
	20	67.68	62.44
	25	68.11	63.03
	50	70.08	64.72
	75	72.13	66.61
	80	72.64	67.09
	90	74.13	68.50
	95	75.47	69.61
	97	76.38	70.00
	98	77.32	70.51
	99	77.95	71.22

30. CAESAR Name: SUBSCAPULAR SKINFOLD, RIGHT

ISO Reference No. N/A

ISO Name:

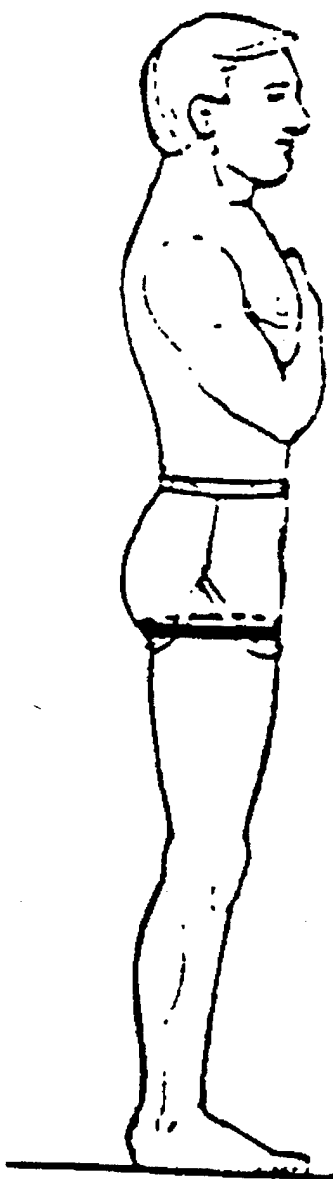
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	15.97	0.63	16.69	0.66
SE Mean	0.26	0.01	0.27	0.01
STD	6.71	0.26	7.10	0.28
Minimum	0.00	0.00	5.50	0.22
Maximum	47.00	1.85	45.00	1.77



		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	6.00	6.00
	2	6.50	7.00
	3	7.00	7.00
	5	7.50	8.00
	10	8.50	9.00
	20	10.00	10.50
	25	11.00	11.00
	50	15.00	15.00
	75	19.50	20.50
	80	21.00	22.50
	90	25.50	27.00
	95	28.50	31.00
	97	30.00	33.00
	98	33.50	35.00
	99	36.00	36.50
English (in)			
	1	0.24	0.24
	2	0.26	0.28
	3	0.28	0.28
	5	0.30	0.31
	10	0.33	0.35
	20	0.39	0.41
	25	0.43	0.43
	50	0.59	0.59
	75	0.77	0.81
	80	0.83	0.89
	90	1.00	1.06
	95	1.12	1.22
	97	1.18	1.30
	98	1.32	1.38
	99	1.42	1.44

31. CAESAR Name: THIGH CIRCUMFERENCE, MAXIMUM, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	592.45	23.32	583.71	22.98
SE Mean	1.64	0.06	1.68	0.07
STD	41.58	1.64	44.37	1.75
Minimum	467.00	18.39	463.00	18.23
Maximum	704.00	27.72	717.00	28.23



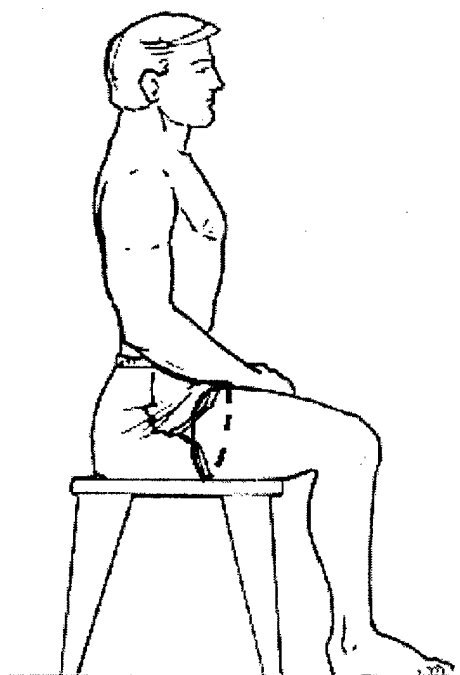
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	489.00	495.00
	2	497.00	503.00
	3	509.00	506.00
	5	523.00	514.00
	10	539.00	530.00
	20	558.00	544.00
	25	566.00	551.00
	50	592.00	581.00
	75	621.00	612.00
	80	628.00	621.00
	90	647.00	642.00
	95	660.00	664.00
	97	668.00	669.00
	98	672.00	681.00
	99	688.00	701.00
English (in)			
	1	19.25	19.49
	2	19.57	19.80
	3	20.04	19.92
	5	20.59	20.24
	10	21.22	20.87
	20	21.97	21.42
	25	22.28	21.69
	50	23.31	22.87
	75	24.45	24.09
	80	24.72	24.45
	90	25.47	25.28
	95	25.98	26.14
	97	26.30	26.34
	98	26.46	26.81
	99	27.09	27.60

32. CAESAR Name: THIGH CIRCUMFERENCE, MAXIMUM, SITTING, RIGHT

ISO Reference No. N/A

ISO Name:

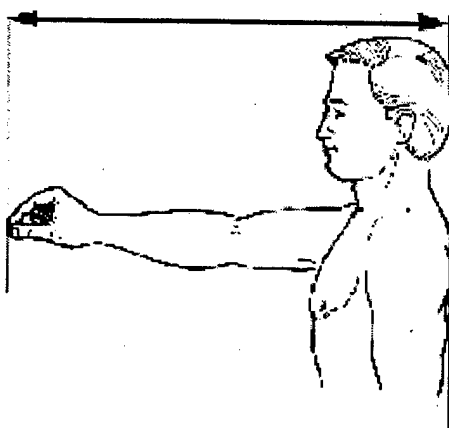
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	592.32	23.32	583.42	22.97
SE Mean	1.63	0.06	1.65	0.06
STD	41.52	1.63	43.44	1.71
Minimum	462.00	18.19	471.00	18.54
Maximum	706.00	27.80	732.00	28.82



		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	482.00	490.00
	2	503.00	507.00
	3	514.00	510.00
	5	522.00	515.00
	10	538.00	528.00
	20	558.00	545.00
	25	565.00	551.00
	50	593.00	582.00
	75	620.00	612.00
	80	626.00	619.00
	90	645.00	640.00
	95	662.00	663.00
	97	667.00	670.00
	98	676.00	679.00
	99	688.00	687.00
English (in)			
	1	18.98	19.29
	2	19.80	19.96
	3	20.24	20.08
	5	20.55	20.28
	10	21.18	20.79
	20	21.97	21.46
	25	22.24	21.69
	50	23.35	22.91
	75	24.41	24.09
	80	24.65	24.37
	90	25.39	25.20
	95	26.06	26.10
	97	26.26	26.38
	98	26.61	26.73
	99	27.09	27.05

33. CAESAR Name: THUMB TIP REACH, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	810.90	31.93	736.77	29.01
SE Mean	1.57	0.06	1.36	0.05
STD	40.02	1.58	35.92	1.41
Minimum	698.30	27.49	639.60	25.18
Maximum	922.00	36.30	858.00	33.78



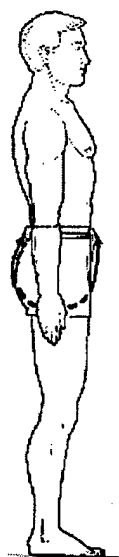
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	722.30	654.00
	2	734.60	671.00
	3	738.30	677.60
	5	746.30	683.00
	10	762.00	691.00
	20	776.30	704.30
	25	783.30	708.60
	50	809.30	736.60
	75	838.30	761.00
	80	843.00	767.30
	90	866.30	782.00
	95	876.30	796.30
	97	884.30	806.00
	98	891.60	818.00
	99	905.00	828.60
English (in)			
	1	28.44	25.75
	2	28.92	26.42
	3	29.07	26.68
	5	29.38	26.89
	10	30.00	27.20
	20	30.56	27.73
	25	30.84	27.90
	50	31.86	29.00
	75	33.00	29.96
	80	33.19	30.21
	90	34.11	30.79
	95	34.50	31.35
	97	34.81	31.73
	98	35.10	32.20
	99	35.63	32.62

34. CAESAR Name: TOTAL CROTCH LENGTH

ISO Reference No. N/A

ISO Name:

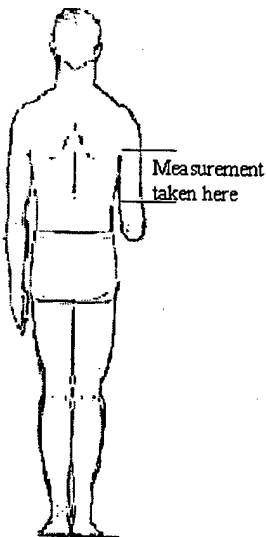
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	695.00	695.00
Weighted Size	643.62	643.62	693.26	693.26
Mean	635.94	25.04	674.20	26.54
SE Mean	0.20	0.01	2.14	0.08
STD	46.01	1.81	56.46	2.22
Minimum	474.00	18.66	490.00	19.29
Maximum	845.00	33.27	833.00	32.80



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	542.00	535.00
	2	551.00	550.00
	3	557.00	564.00
	5	569.00	573.00
	10	580.00	596.00
	20	601.00	629.00
	25	607.00	637.00
	50	633.00	677.00
	75	661.00	715.00
	80	670.00	723.00
	90	697.00	746.00
	95	722.00	762.00
	97	735.00	772.00
	98	745.00	783.00
	99	756.00	790.00
English (in)			
	1	21.34	21.06
	2	21.69	21.65
	3	21.93	22.20
	5	22.40	22.56
	10	22.83	23.46
	20	23.66	24.76
	25	23.90	25.08
	50	24.92	26.65
	75	26.02	28.15
	80	26.38	28.46
	90	27.44	29.37
	95	28.43	30.00
	97	28.94	30.39
	98	29.33	30.83
	99	29.76	31.10

35. CAESAR Name: TRICEPS SKINFOLD
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	695.00	695.00
Weighted Size	643.62	643.62	693.26	693.26
Mean	11.55	0.45	20.12	0.79
SE Mean	1.81	0.07	0.24	0.01
STD	5.17	0.20	6.43	0.25
Minimum	0.00	0.00	6.00	0.24
Maximum	35.00	1.38	42.00	1.65



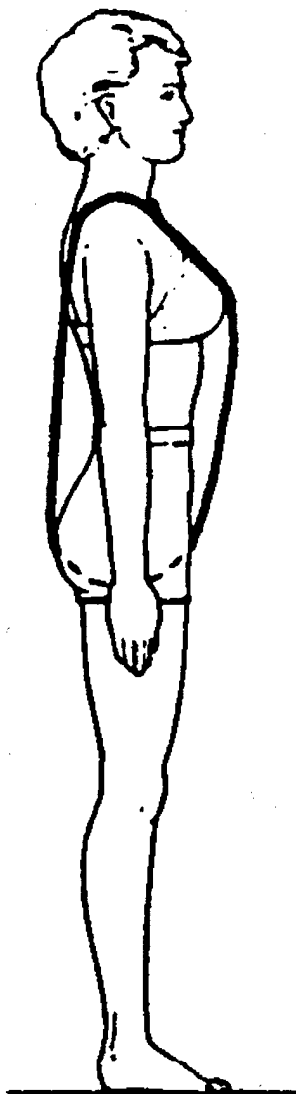
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)	1	3.00	7.00
	2	3.50	8.50
	3	4.00	9.50
	5	4.50	11.00
	10	6.00	12.00
	20	7.00	14.50
	25	7.50	15.50
	50	11.00	20.00
	75	14.50	24.00
	80	15.50	25.00
	90	19.00	28.50
	95	21.00	32.00
	97	23.00	34.50
	98	24.50	35.50
	99	27.00	36.50
English (in)	1	0.12	0.28
	2	0.14	0.33
	3	0.16	0.37
	5	0.18	0.43
	10	0.24	0.47
	20	0.28	0.57
	25	0.30	0.61
	50	0.43	0.79
	75	0.57	0.94
	80	0.61	0.98
	90	0.75	1.12
	95	0.83	1.26
	97	0.91	1.36
	98	0.96	1.40
	99	1.06	1.44

36. CAESAR Name: VERTICAL TRUNK CIRCUMFERENCE, RIGHT

ISO Reference No. N/A

ISO Name:

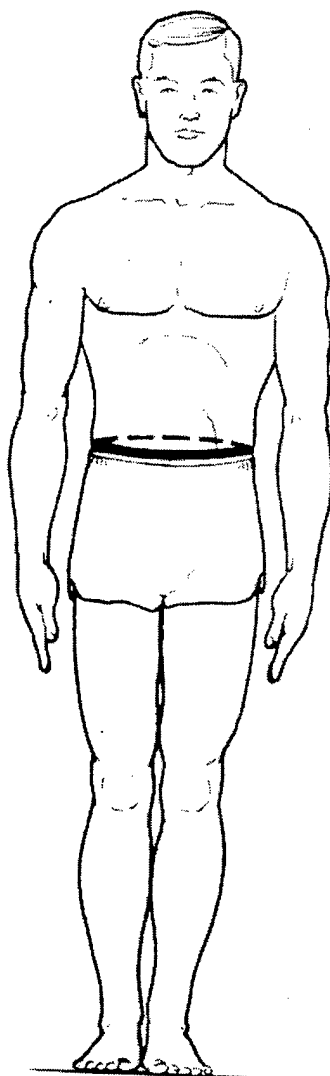
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	695.00	695.00
Weighted Size	643.62	643.62	693.26	693.26
Mean	1692.90	66.65	1539.79	60.62
SE Mean	3.00	0.12	2.37	0.09
STD	76.19	3.00	62.54	2.46
Minimum	1468.00	57.80	1348.00	53.07
Maximum	1900.00	74.80	1768.00	69.61



		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	1521.00	1401.00
	2	1542.00	1417.00
	3	1553.00	1428.00
	5	1562.00	1442.00
	10	1595.00	1458.00
	20	1630.00	1487.00
	25	1643.00	1496.00
	50	1689.00	1539.00
	75	1744.00	1581.00
	80	1757.00	1591.00
	90	1795.00	1617.00
	95	1827.00	1645.00
	97	1844.00	1660.00
	98	1861.00	1671.00
	99	1883.00	1691.00
English (in)			
	1	59.88	55.16
	2	60.71	55.79
	3	61.14	56.22
	5	61.50	56.77
	10	62.80	57.40
	20	64.17	58.54
	25	64.69	58.90
	50	66.50	60.59
	75	68.66	62.24
	80	69.17	62.64
	90	70.67	63.66
	95	71.93	64.76
	97	72.60	65.35
	98	73.27	65.79
	99	74.13	66.57

37. CAESAR Name: WAIST CIRCUMFERENCE, PREFERRED
ISO Reference No. N/A
ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	693.00	693.00
Weighted Size	644.70	644.70	691.38	691.38
Mean	864.84	34.05	733.32	28.87
SE Mean	2.72	0.11	2.39	0.09
STD	69.17	2.72	62.99	2.48
Minimum	652.00	25.67	580.00	22.83
Maximum	1120.00	44.09	935.00	36.81



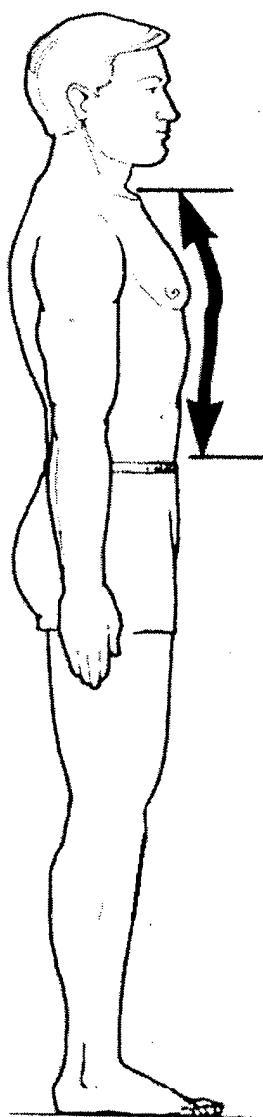
		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	716.00	612.00
	2	729.00	620.00
	3	739.00	628.00
	5	752.00	639.00
	10	775.00	655.00
	20	806.00	679.00
	25	818.00	688.00
	50	864.00	729.00
	75	909.00	773.00
	80	921.00	785.00
	90	952.00	818.00
	95	982.00	842.00
	97	1004.00	869.00
	98	1016.00	880.00
	99	1026.00	891.00
English (in)			
	1	28.19	24.09
	2	28.70	24.41
	3	29.09	24.72
	5	29.61	25.16
	10	30.51	25.79
	20	31.73	26.73
	25	32.20	27.09
	50	34.02	28.70
	75	35.79	30.43
	80	36.26	30.91
	90	37.48	32.20
	95	38.66	33.15
	97	39.53	34.21
	98	40.00	34.65
	99	40.39	35.08

38. CAESAR Name: WAIST FRONT LENGTH

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	457.16	18.00	364.76	14.36
SE Mean	1.44	0.06	1.20	0.05
STD	36.58	1.44	31.67	1.25
Minimum	346.00	13.62	297.00	11.69
Maximum	593.00	23.35	653.00	25.71



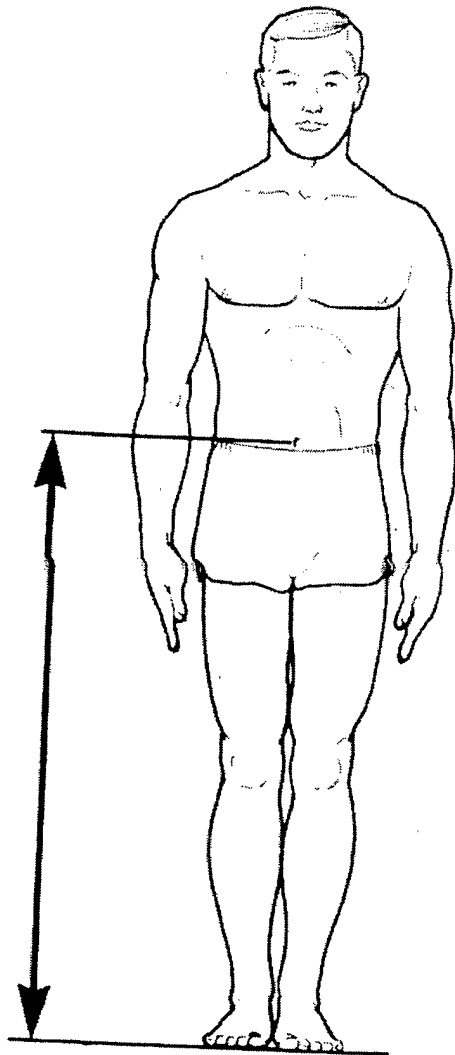
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	373.00	305.00
	2	380.00	310.00
	3	387.00	313.00
	5	397.00	318.00
	10	413.00	330.00
	20	427.00	341.00
	25	432.00	344.00
	50	456.00	361.00
	75	483.00	380.00
	80	487.00	387.00
	90	504.00	402.00
	95	518.00	423.00
	97	525.00	433.00
	98	533.00	438.00
	99	551.00	453.00
English (in)			
	1	14.69	12.01
	2	14.96	12.20
	3	15.24	12.32
	5	15.63	12.52
	10	16.26	12.99
	20	16.81	13.43
	25	17.01	13.54
	50	17.95	14.21
	75	19.02	14.96
	80	19.17	15.24
	90	19.84	15.83
	95	20.39	16.65
	97	20.67	17.05
	98	20.98	17.24
	99	21.69	17.83

39. CAESAR Name: WAIST HEIGHT, PREFERRED

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	1046.97	41.22	1014.16	39.93
SE Mean	2.16	0.09	2.09	0.08
STD	54.88	2.16	54.99	2.17
Minimum	889.00	35.00	637.00	25.08
Maximum	1210.00	47.64	1211.00	47.68



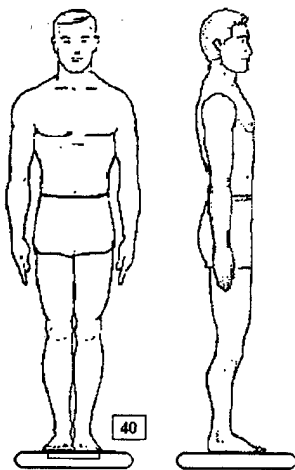
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)	1	925.00	893.00
	2	938.00	912.00
	3	945.00	918.00
	5	959.00	932.00
	10	979.00	950.00
	20	1002.00	970.00
	25	1010.00	977.00
	50	1044.00	1011.00
	75	1080.00	1048.00
	80	1091.00	1057.00
	90	1120.00	1084.00
	95	1141.00	1109.00
	97	1160.00	1119.00
	98	1165.00	1133.00
	99	1180.00	1143.00
English (in)	1	36.42	35.16
	2	36.93	35.91
	3	37.20	36.14
	5	37.76	36.69
	10	38.54	37.40
	20	39.45	38.19
	25	39.76	38.46
	50	41.10	39.80
	75	42.52	41.26
	80	42.95	41.61
	90	44.09	42.68
	95	44.92	43.66
	97	45.67	44.06
	98	45.87	44.61
	99	46.46	45.00

40. CAESAR Name: WEIGHT (MASS)

ISO Reference No. N/A

ISO Name:

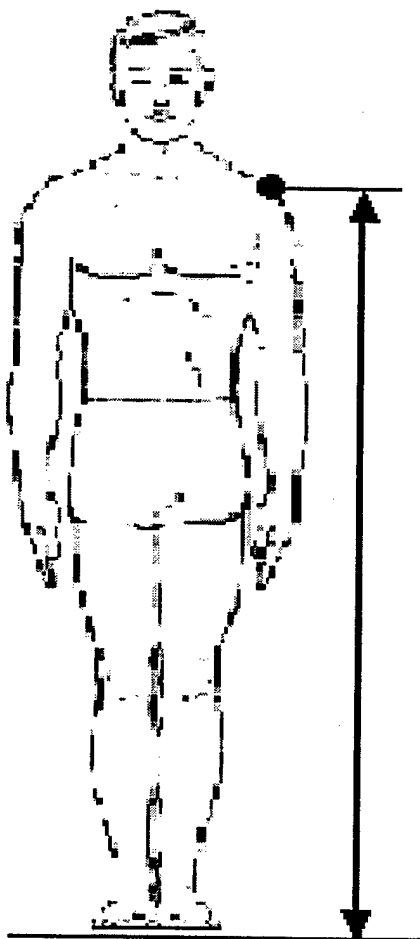
	MEN		WOMEN	
	Metric (kg)	English (lb)	Metric (kg)	English (lb)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	80.02	176.44	62.43	137.63
SE Mean	0.42	0.92	0.30	0.65
STD	10.64	23.47	7.79	17.17
Minimum	2806.70	110.50	47.17	104.00
Maximum	6197.60	244.00	85.96	189.50



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (kg)			
	1	56.69	47.63
	2	58.28	48.99
	3	61.00	49.21
	5	63.72	50.58
	10	66.44	52.62
	20	70.52	55.34
	25	72.56	56.47
	50	79.59	61.69
	75	87.30	68.49
	80	89.34	69.63
	90	94.33	73.03
	95	98.64	75.75
	97	100.68	77.56
	98	102.27	78.47
	99	103.40	80.60
English (lb)			
	1	125.00	105.00
	2	128.50	108.00
	3	134.50	108.50
	5	140.50	111.50
	10	146.50	116.00
	20	155.50	122.00
	25	160.00	124.50
	50	175.50	136.00
	75	192.50	151.00
	80	197.00	153.50
	90	208.00	161.00
	95	217.50	167.00
	97	222.00	171.00
	98	225.50	173.00
	99	228.00	177.70

41. CAESAR Name: ACROMIAL HEIGHT, STANDING, LEFT
 ISO Reference No. 4.1.4
 ISO Name: Shoulder Height

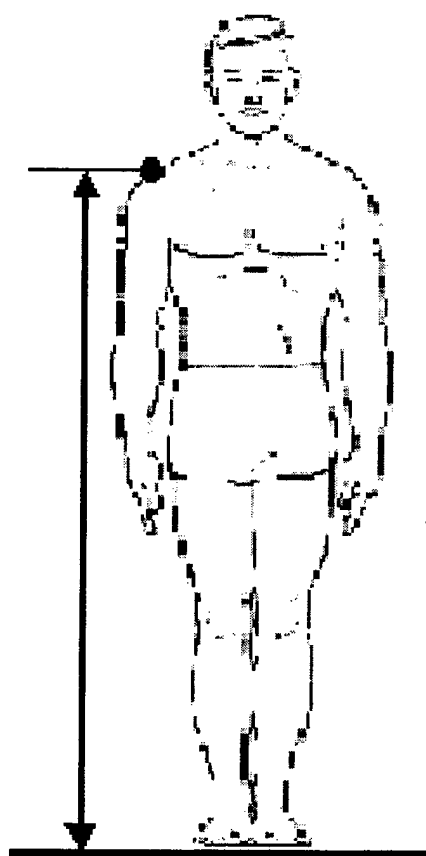
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	693.00	693.00
Weighted Size	643.96	643.96	691.38	691.38
Mean	1465.26	57.69	1353.11	53.27
SE Mean	2.81	0.11	2.37	0.09
STD	71.29	2.81	62.38	2.46
Minimum	1264.00	49.76	1176.00	46.30
Maximum	1664.00	65.51	1556.00	61.26



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1306.00	1222.00
	2	1328.00	1232.00
	3	1338.00	1238.00
	5	1354.00	1250.00
	10	1376.00	1276.00
	20	1406.00	1302.00
	25	1416.00	1310.00
	50	1464.00	1350.00
	75	1512.00	1394.00
	80	1524.00	1402.00
	90	1564.00	1434.00
	95	1596.00	1462.00
	97	1608.00	1482.00
	98	1622.00	1488.00
	99	1642.00	1510.00
English (in)			
	1	51.42	48.11
	2	52.28	48.50
	3	52.68	48.74
	5	53.31	49.21
	10	54.17	50.24
	20	55.35	51.26
	25	55.75	51.57
	50	57.64	53.15
	75	59.53	54.88
	80	60.00	55.20
	90	61.57	56.46
	95	62.83	57.56
	97	63.31	58.35
	98	63.86	58.58
	99	64.65	59.45

42. CAESAR Name: ACROMIAL HEIGHT, STANDING, RIGHT
 ISO Reference No. 4.1.4
 ISO Name: Shoulder Height, Right

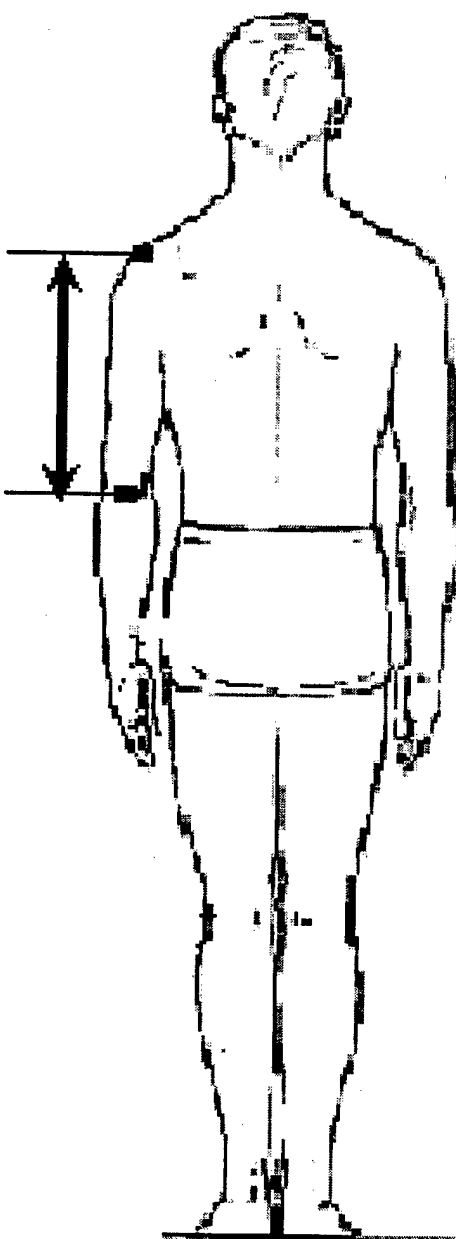
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	693.00	693.00
Weighted Size	643.96	643.96	691.38	691.38
Mean	1456.86	57.36	1346.88	53.03
SE Mean	2.77	0.11	2.35	0.09
STD	70.42	2.77	61.93	2.44
Minimum	1268.00	49.92	1162.00	45.75
Maximum	1650.00	64.96	1540.00	60.63



	Percentiles	MEN Quantile	WOMEN Quantile
Metric (mm)			
	1	1302.00	1216.00
	2	1318.00	1226.00
	3	1334.00	1234.00
	5	1349.00	1246.00
	10	1364.00	1270.00
	20	1396.00	1296.00
	25	1406.00	1303.00
	50	1456.00	1344.00
	75	1502.00	1386.00
	80	1512.00	1398.00
	90	1554.00	1426.00
	95	1582.00	1450.00
	97	1596.00	1470.00
	98	1604.00	1480.00
	99	1636.00	1494.00
English (in)			
	1	51.26	47.87
	2	51.89	48.27
	3	52.52	48.58
	5	53.11	49.06
	10	53.70	50.00
	20	54.96	51.02
	25	55.35	51.30
	50	57.32	52.91
	75	59.13	54.57
	80	59.53	55.04
	90	61.18	56.14
	95	62.28	57.09
	97	62.83	57.87
	98	63.15	58.27
	99	64.41	58.82

43. CAESAR Name: ACROMION-RADIALE LENGTH, LEFT
 ISO Reference No. 4.2.6
 ISO Name: Shoulder-Elbow Length

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	644.00	644.00	693.00	693.00
Weighted Size	642.88	642.88	691.38	691.38
Mean	328.44	12.93	299.85	11.80
SE Mean	0.77	0.03	0.69	0.03
STD	19.66	0.77	18.19	0.72
Minimum	267.21	10.52	256.10	10.08
Maximum	395.32	15.56	364.76	14.36



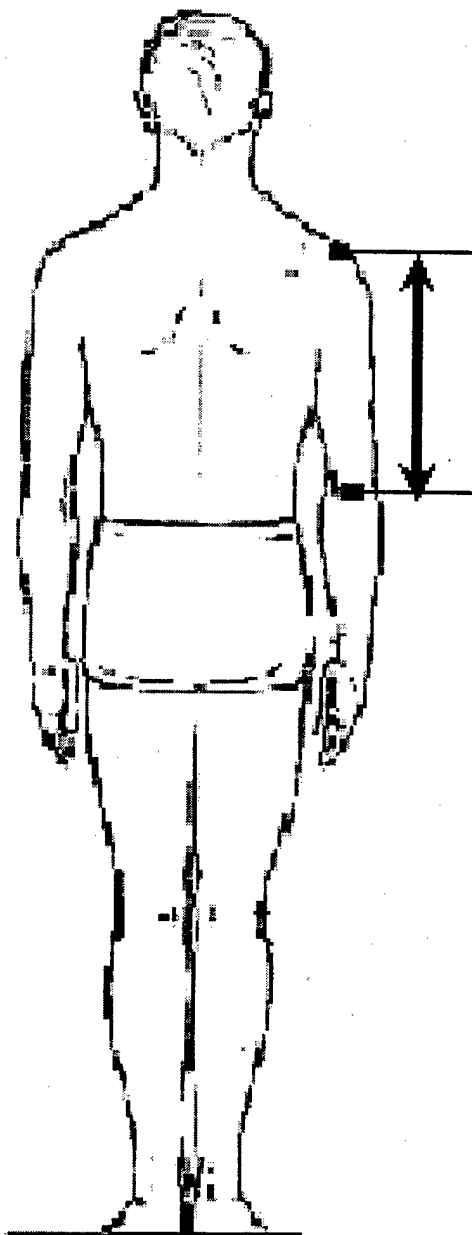
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	284.96	262.22
	2	291.52	264.76
	3	292.18	268.46
	5	296.56	271.68
	10	302.24	276.28
	20	311.46	283.98
	25	315.20	287.00
	50	328.60	299.59
	75	341.47	311.87
	80	345.02	315.96
	90	355.04	322.94
	95	361.43	330.67
	97	363.60	336.56
	98	367.63	339.75
	99	377.13	349.02
English (in)			
	1	11.22	10.32
	2	11.48	10.42
	3	11.50	10.57
	5	11.68	10.70
	10	11.90	10.88
	20	12.26	11.18
	25	12.41	11.30
	50	12.94	11.79
	75	13.44	12.28
	80	13.58	12.44
	90	13.98	12.71
	95	14.23	13.02
	97	14.31	13.25
	98	14.47	13.38
	99	14.85	13.74

44. CAESAR Name: ACROMION-RADIALE LENGTH, RIGHT

ISO Reference No. 4.2.6

ISO Name: Shoulder-Elbow Length

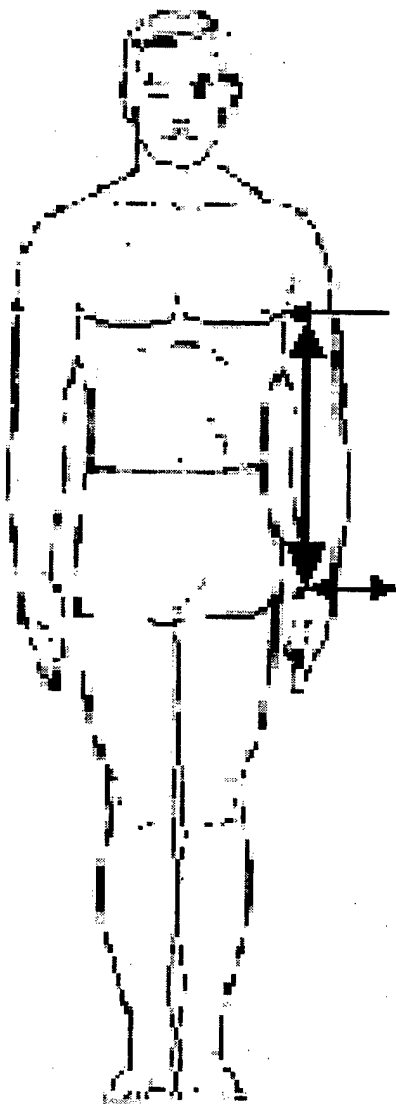
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	693.00	693.00
Weighted Size	643.96	643.96	691.38	691.38
Mean	329.97	12.99	301.71	11.88
SE Mean	0.74	0.03	0.68	0.03
STD	18.89	0.74	17.79	0.70
Minimum	277.74	10.93	250.68	9.87
Maximum	392.71	15.46	364.64	14.36



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	288.36	263.24
	2	291.45	266.57
	3	294.68	270.41
	5	298.17	274.69
	10	306.05	280.82
	20	313.94	286.63
	25	317.36	289.30
	50	329.43	299.99
	75	342.23	313.74
	80	345.75	316.38
	90	354.51	325.06
	95	362.40	332.73
	97	364.31	337.40
	98	366.57	341.46
	99	374.25	346.62
English (in)			
	1	11.35	10.36
	2	11.47	10.49
	3	11.60	10.65
	5	11.74	10.81
	10	12.05	11.06
	20	12.36	11.28
	25	12.49	11.39
	50	12.97	11.81
	75	13.47	12.35
	80	13.61	12.46
	90	13.96	12.80
	95	14.27	13.10
	97	14.34	13.28
	98	14.43	13.44
	99	14.73	13.65

45. CAESAR Name: ARM INSEAM, LEFT
 ISO Reference No. N/A
 ISO Name:

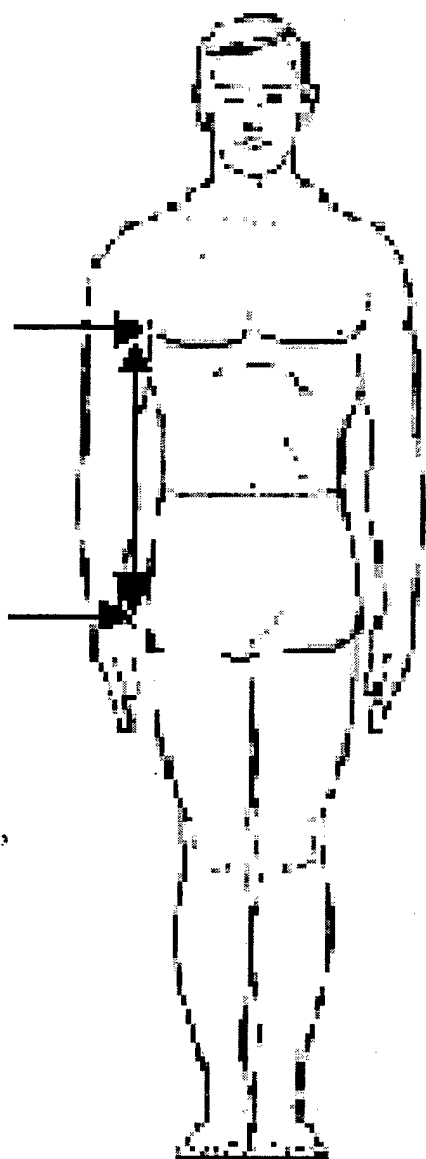
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	461.77	18.18	430.64	16.95
SE Mean	1.13	0.04	1.05	0.04
STD	28.75	1.13	27.66	1.09
Minimum	385.85	15.19	347.43	13.68
Maximum	570.43	22.46	520.31	20.48



		MEN	WOMEN
	Percentiles	Quantile	Quantile
Metric (mm)			
	1	397.32	371.64
	2	405.01	378.95
	3	409.14	383.20
	5	415.86	386.04
	10	424.08	395.00
	20	437.20	406.37
	25	443.16	410.32
	50	460.79	430.36
	75	481.54	448.73
	80	486.24	453.55
	90	497.34	466.15
	95	507.93	477.12
	97	517.96	483.21
	98	522.17	489.14
	99	534.29	495.39
English (in)			
	1	15.64	14.63
	2	15.95	14.92
	3	16.11	15.09
	5	16.37	15.20
	10	16.70	15.55
	20	17.21	16.00
	25	17.45	16.15
	50	18.14	16.94
	75	18.96	17.67
	80	19.14	17.86
	90	19.58	18.35
	95	20.00	18.78
	97	20.39	19.02
	98	20.56	19.26
	99	21.03	19.50

46. CAESAR Name: ARM INSEAM, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	463.88	18.26	434.08	17.09
SE Mean	1.13	0.04	1.05	0.04
STD	28.81	1.13	27.63	1.09
Minimum	381.43	15.02	361.99	14.25
Maximum	566.75	22.31	516.95	20.35



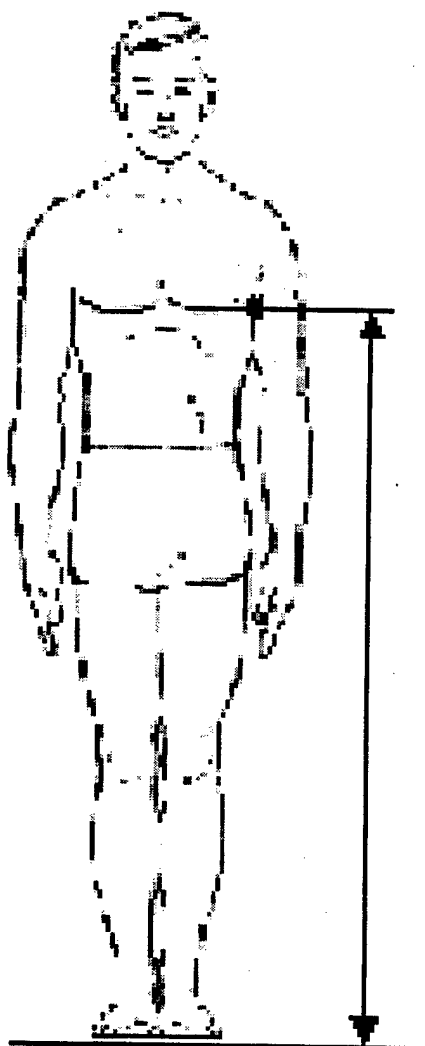
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	399.49	375.74
	2	403.08	379.05
	3	409.24	383.55
	5	416.74	391.36
	10	430.36	398.86
	20	440.03	409.77
	25	445.07	414.97
	50	463.00	432.61
	75	483.08	452.97
	80	488.14	456.09
	90	501.97	470.26
	95	511.69	481.18
	97	520.86	488.59
	98	524.63	496.88
	99	533.99	503.71
English (in)			
	1	15.73	14.79
	2	15.87	14.92
	3	16.11	15.10
	5	16.41	15.41
	10	16.94	15.70
	20	17.32	16.13
	25	17.52	16.34
	50	18.23	17.03
	75	19.02	17.83
	80	19.22	17.96
	90	19.76	18.51
	95	20.15	18.94
	97	20.51	19.24
	98	20.65	19.56
	99	21.02	19.83

47. CAESAR Name: AXILLA HEIGHT, LEFT

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	1341.81	52.83	1244.44	48.99
SE Mean	2.63	0.10	2.23	0.09
STD	66.84	2.63	58.69	2.31
Minimum	1166.00	45.91	1082.00	42.60
Maximum	1524.00	60.00	1432.00	56.38



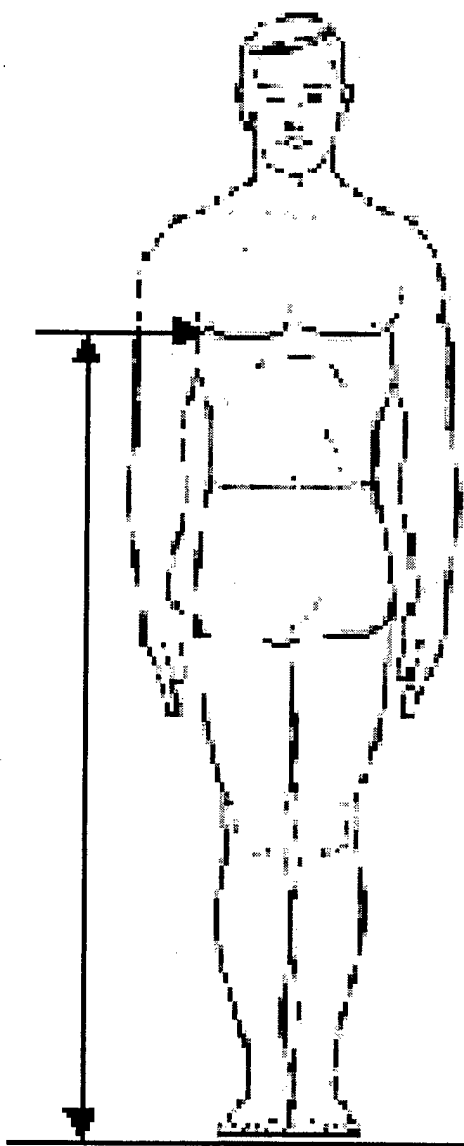
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1190.00	1120.00
	2	1210.00	1128.00
	3	1224.00	1136.00
	5	1238.00	1146.00
	10	1262.00	1172.00
	20	1284.00	1195.00
	25	1296.00	1204.00
	50	1338.00	1242.00
	75	1384.00	1282.00
	80	1398.00	1292.00
	90	1432.00	1322.00
	95	1458.00	1346.00
	97	1478.00	1356.00
	98	1488.00	1360.00
	99	1506.00	1400.00
English (in)			
	1	46.85	44.09
	2	47.64	44.41
	3	48.19	44.72
	5	48.74	45.12
	10	49.69	46.14
	20	50.55	47.05
	25	51.02	47.40
	50	52.68	48.90
	75	54.49	50.47
	80	55.04	50.87
	90	56.38	52.05
	95	57.40	52.99
	97	58.19	53.39
	98	58.58	53.54
	99	59.29	55.12

48. CAESAR Name: AXILLA HEIGHT, RIGHT

ISO Reference No. N/A

ISO Name:

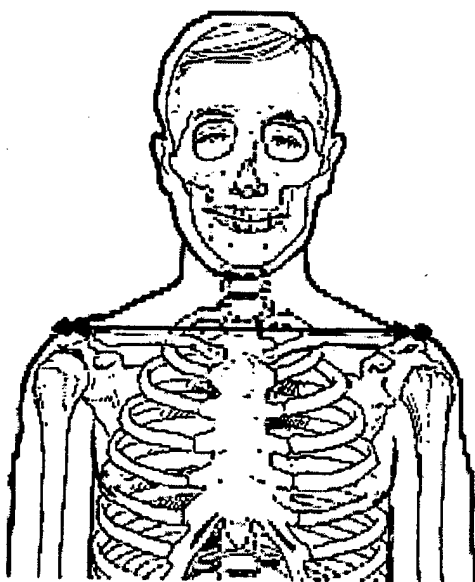
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	1336.36	52.61	1241.93	48.90
SE Mean	2.63	0.10	2.25	0.09
STD	66.73	2.63	59.23	2.33
Minimum	1160.00	45.67	1084.00	42.68
Maximum	1534.00	60.39	1434.00	56.46



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1188.00	1106.00
	2	1196.00	1120.00
	3	1218.00	1128.00
	5	1232.00	1142.00
	10	1254.00	1168.00
	20	1278.00	1194.00
	25	1292.00	1204.00
	50	1332.00	1240.00
	75	1380.00	1282.00
	80	1392.00	1292.00
	90	1424.00	1320.00
	95	1452.00	1341.00
	97	1468.00	1354.00
	98	1480.00	1364.00
	99	1506.00	1386.00
English (in)			
	1	46.77	43.54
	2	47.09	44.09
	3	47.95	44.41
	5	48.50	44.96
	10	49.37	45.98
	20	50.31	47.01
	25	50.87	47.40
	50	52.44	48.82
	75	54.33	50.47
	80	54.80	50.87
	90	56.06	51.97
	95	57.17	52.80
	97	57.80	53.31
	98	58.27	53.70
	99	59.29	54.57

49. CAESAR Name: BIACROMIAL BREADTH
 ISO Reference No. 4.2.8
 ISO Name: Shoulder (Biacromial) Breadth

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	693.00	693.00
Weighted Size	643.96	643.96	691.38	691.38
Mean	419.41	16.51	373.13	14.69
SE Mean	0.79	0.03	0.68	0.03
STD	20.13	0.79	17.90	0.70
Minimum	348.76	13.73	319.67	12.59
Maximum	474.89	18.70	427.70	16.84



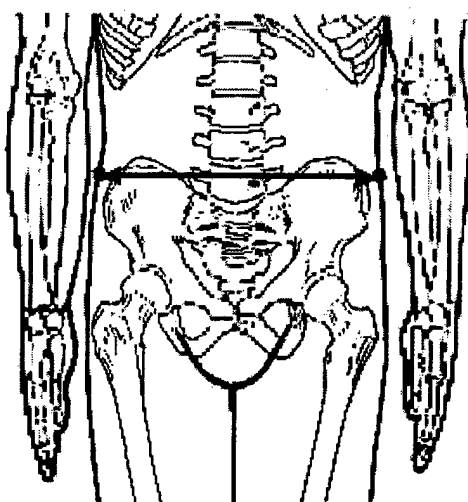
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	372.09	333.04
	2	379.66	337.15
	3	381.66	340.81
	5	386.96	344.22
	10	393.20	351.03
	20	402.63	357.58
	25	405.78	360.75
	50	419.73	373.55
	75	432.09	384.77
	80	435.32	387.04
	90	446.24	396.51
	95	452.29	402.79
	97	456.87	407.54
	98	460.59	412.83
	99	463.62	416.91
English (in)			
	1	14.65	13.11
	2	14.95	13.27
	3	15.03	13.42
	5	15.23	13.55
	10	15.48	13.82
	20	15.85	14.08
	25	15.98	14.20
	50	16.52	14.71
	75	17.01	15.15
	80	17.14	15.24
	90	17.57	15.61
	95	17.81	15.86
	97	17.99	16.05
	98	18.13	16.25
	99	18.25	16.41

50. CAESAR Name: BI-CRISTALE BREADTH

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	643.00	643.00	691.00	691.00
Weighted Size	642.14	642.14	689.50	689.50
Mean	332.50	13.09	297.32	11.71
SE Mean	1.04	0.04	0.77	0.03
STD	26.25	1.03	20.20	0.80
Minimum	255.47	10.06	239.63	9.43
Maximum	410.87	16.18	415.90	16.37



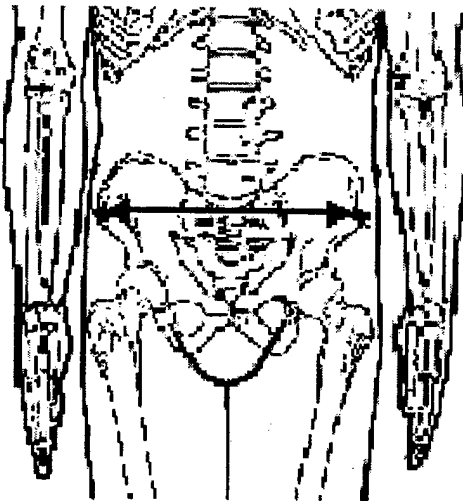
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	271.62	256.41
	2	281.65	258.99
	3	285.37	262.75
	5	288.89	266.10
	10	296.75	272.90
	20	310.43	279.99
	25	314.53	283.04
	50	332.37	295.62
	75	350.27	309.43
	80	355.58	313.40
	90	366.11	323.58
	95	376.22	333.57
	97	380.76	337.24
	98	386.69	341.68
	99	392.87	343.90
English (in)			
	1	10.69	10.09
	2	11.09	10.20
	3	11.24	10.34
	5	11.37	10.48
	10	11.68	10.74
	20	12.22	11.02
	25	12.38	11.14
	50	13.09	11.64
	75	13.79	12.18
	80	14.00	12.34
	90	14.41	12.74
	95	14.81	13.13
	97	14.99	13.28
	98	15.22	13.45
	99	15.47	13.54

51. CAESAR Name: BI-SPINOUS BREADTH

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	257.85	10.15	241.39	9.50
SE Mean	0.78	0.03	0.74	0.03
STD	19.93	0.78	19.59	0.77
Minimum	199.82	7.87	191.67	7.55
Maximum	342.56	13.49	304.89	12.00



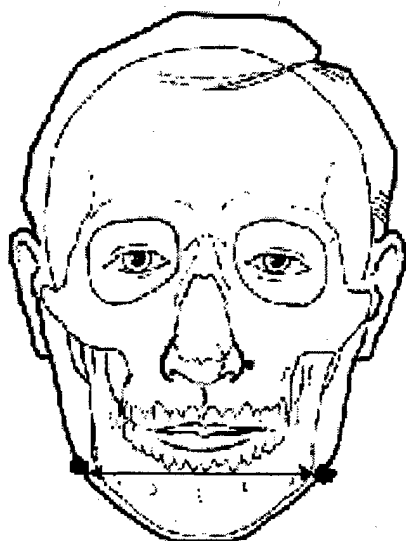
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	212.70	199.85
	2	220.48	202.52
	3	223.07	205.42
	5	227.32	210.02
	10	232.98	216.58
	20	240.65	224.74
	25	243.84	227.79
	50	257.53	241.16
	75	271.13	255.01
	80	273.29	258.50
	90	281.92	265.94
	95	289.37	273.88
	97	297.33	279.12
	98	302.84	282.70
	99	308.47	289.72
English (in)			
	1	8.37	7.87
	2	8.68	7.97
	3	8.78	8.09
	5	8.95	8.27
	10	9.17	8.53
	20	9.47	8.85
	25	9.60	8.97
	50	10.14	9.49
	75	10.67	10.04
	80	10.76	10.18
	90	11.10	10.47
	95	11.39	10.78
	97	11.71	10.99
	98	11.92	11.13
	99	12.14	11.41

52. CAESAR Name: BIGONIAL BREADTH

ISO Reference No. N/A

ISO Name:

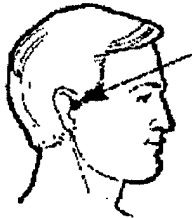
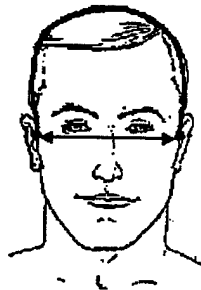
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	121.10	4.77	108.64	4.28
SE Mean	0.35	0.01	0.25	0.01
STD	8.91	0.35	6.70	0.26
Minimum	98.11	3.86	87.85	3.46
Maximum	153.96	6.06	129.04	5.08



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	102.47	91.21
	2	104.80	94.04
	3	106.05	95.56
	5	108.33	96.77
	10	110.16	100.29
	20	113.20	103.33
	25	114.59	104.41
	50	120.76	108.77
	75	126.39	113.18
	80	128.15	114.16
	90	132.55	116.93
	95	136.17	119.27
	97	139.03	120.99
	98	140.87	122.37
	99	147.01	123.99
English (in)			
	1	4.03	3.59
	2	4.13	3.70
	3	4.18	3.76
	5	4.26	3.81
	10	4.34	3.95
	20	4.46	4.07
	25	4.51	4.11
	50	4.75	4.28
	75	4.98	4.46
	80	5.05	4.49
	90	5.22	4.60
	95	5.36	4.70
	97	5.47	4.76
	98	5.55	4.82
	99	5.79	4.88

53. CAESAR Name: BITRAGION BREADTH
ISO Reference No. N/A
ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	692.00	692.00
Weighted Size	643.96	643.96	690.44	690.44
Mean	148.70	5.85	138.73	5.46
SE Mean	0.27	0.01	0.22	0.01
STD	6.90	0.27	5.88	0.23
Minimum	131.58	5.18	119.13	4.69
Maximum	179.29	7.06	179.80	7.08



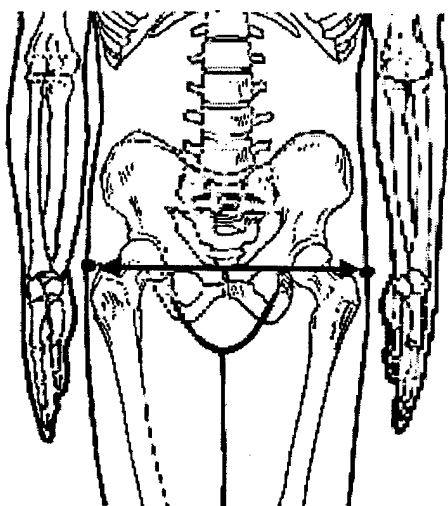
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	134.88	125.34
	2	135.75	127.21
	3	136.46	128.56
	5	138.02	130.10
	10	140.58	131.80
	20	143.07	134.03
	25	144.23	134.69
	50	148.24	138.74
	75	152.73	142.20
	80	153.99	143.15
	90	157.42	145.89
	95	160.37	148.40
	97	162.90	150.14
	98	164.63	151.44
	99	167.92	154.28
English (in)			
	1	5.31	4.93
	2	5.34	5.01
	3	5.37	5.06
	5	5.43	5.12
	10	5.53	5.19
	20	5.63	5.28
	25	5.68	5.30
	50	5.84	5.46
	75	6.01	5.60
	80	6.06	5.64
	90	6.20	5.74
	95	6.31	5.84
	97	6.41	5.91
	98	6.48	5.96
	99	6.61	6.07

54. CAESAR Name: BI-TROCHANTERIC BREADTH, STANDING

ISO Reference No. N/A

ISO Name:

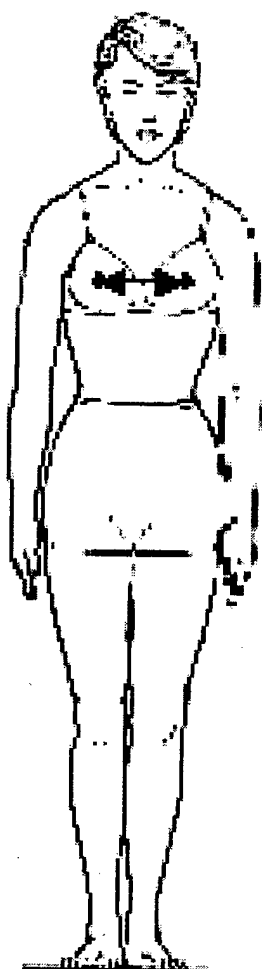
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	691.00	691.00
Weighted Size	643.96	643.96	689.50	689.50
Mean	358.90	14.13	360.20	14.18
SE Mean	0.80	0.03	0.81	0.03
STD	20.29	0.80	21.26	0.84
Minimum	301.75	11.88	301.04	11.85
Maximum	428.17	16.86	422.76	16.64



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	310.19	317.63
	2	314.50	320.00
	3	316.37	322.25
	5	324.60	325.89
	10	334.37	332.84
	20	341.60	340.75
	25	344.92	344.12
	50	358.19	360.86
	75	373.40	374.89
	80	376.86	378.54
	90	385.28	386.33
	95	392.58	394.43
	97	395.69	401.40
	98	398.96	407.88
	99	400.89	414.09
English (in)			
	1	12.21	12.50
	2	12.38	12.60
	3	12.46	12.69
	5	12.78	12.83
	10	13.16	13.10
	20	13.45	13.42
	25	13.58	13.55
	50	14.10	14.21
	75	14.70	14.76
	80	14.84	14.90
	90	15.17	15.21
	95	15.46	15.53
	97	15.58	15.80
	98	15.71	16.06
	99	15.78	16.30

55. CAESAR Name: BUSTPOINT-BUSTPOINT BREADTH
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	227.00	8.94	180.55	7.11
SE Mean	0.79	0.03	0.63	0.02
STD	20.11	0.79	16.71	0.66
Minimum	168.51	6.63	135.37	5.33
Maximum	301.16	11.86	234.23	9.22



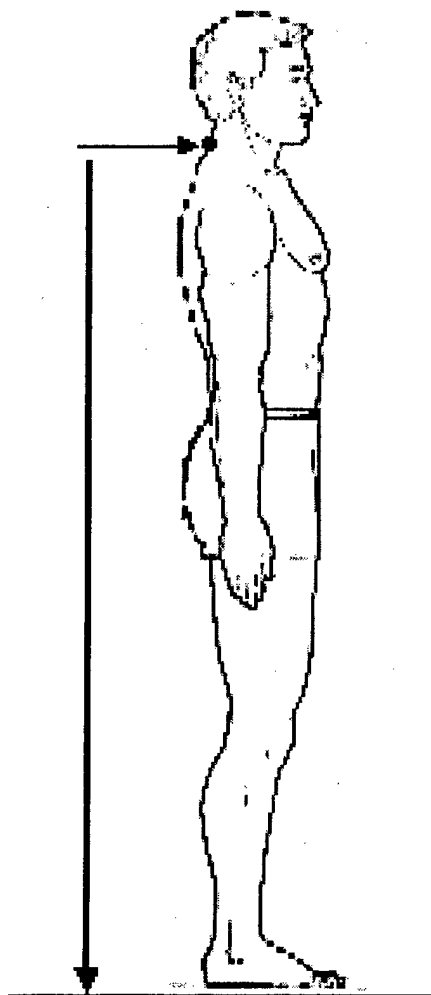
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	180.00	142.69
	2	184.87	146.54
	3	189.37	148.56
	5	194.09	153.98
	10	203.61	158.85
	20	211.23	165.71
	25	213.85	168.31
	50	225.74	181.53
	75	239.98	190.45
	80	242.15	194.82
	90	253.59	202.17
	95	261.67	208.08
	97	267.46	212.40
	98	271.40	215.07
	99	277.29	221.82
English (in)			
	1	7.09	5.62
	2	7.28	5.77
	3	7.46	5.85
	5	7.64	6.06
	10	8.02	6.25
	20	8.32	6.52
	25	8.42	6.63
	50	8.89	7.15
	75	9.45	7.50
	80	9.53	7.67
	90	9.98	7.96
	95	10.30	8.19
	97	10.53	8.36
	98	10.68	8.47
	99	10.92	8.73

56. CAESAR Name: CERVICALE HEIGHT

ISO Reference No. N/A

ISO Name:

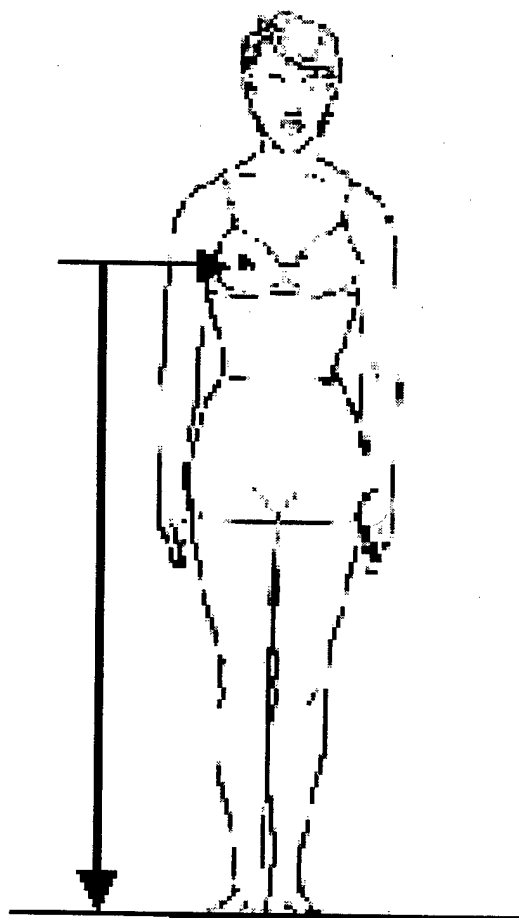
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	1536.55	60.49	1412.63	55.62
SE Mean	2.80	0.11	2.40	0.09
STD	71.06	2.80	63.15	2.49
Minimum	1342.00	52.83	1226.00	48.27
Maximum	1736.00	68.35	1646.00	64.80



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1382.00	1278.00
	2	1398.00	1286.00
	3	1410.00	1298.00
	5	1430.00	1314.00
	10	1450.00	1334.00
	20	1474.00	1360.00
	25	1484.00	1370.00
	50	1534.00	1412.00
	75	1582.00	1452.00
	80	1592.00	1464.00
	90	1632.00	1494.00
	95	1662.00	1522.00
	97	1684.00	1534.00
	98	1700.00	1546.00
	99	1716.00	1570.00
English (in)			
	1	54.41	50.31
	2	55.04	50.63
	3	55.51	51.10
	5	56.30	51.73
	10	57.09	52.52
	20	58.03	53.54
	25	58.43	53.94
	50	60.39	55.59
	75	62.28	57.17
	80	62.68	57.64
	90	64.25	58.82
	95	65.43	59.92
	97	66.30	60.39
	98	66.93	60.87
	99	67.56	61.81

57. CAESAR Name: CHEST HEIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	1291.30	50.84	1189.22	46.82
SE Mean	2.50	0.10	2.29	0.09
STD	63.49	2.50	60.44	2.38
Minimum	1120.00	44.09	996.00	39.21
Maximum	1484.00	58.43	1380.00	54.33



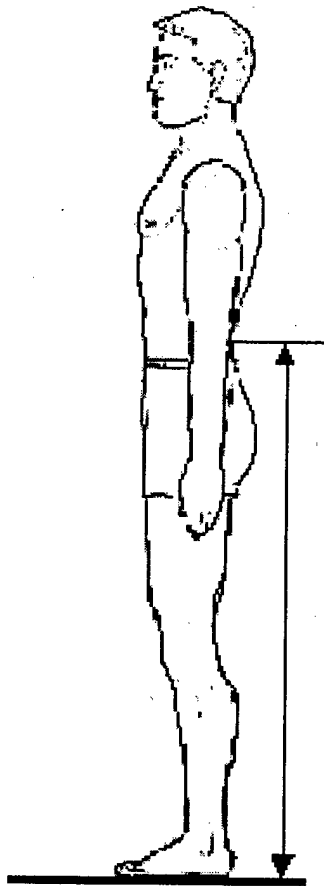
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1148.00	1052.00
	2	1162.00	1068.00
	3	1174.00	1076.00
	5	1192.00	1090.00
	10	1214.00	1114.00
	20	1236.00	1140.00
	25	1248.00	1150.00
	50	1288.00	1186.00
	75	1332.00	1228.00
	80	1345.00	1238.00
	90	1370.00	1266.00
	95	1402.00	1294.00
	97	1420.00	1308.00
	98	1434.00	1316.00
	99	1448.00	1340.00
English (in)			
	1	45.20	41.42
	2	45.75	42.05
	3	46.22	42.36
	5	46.93	42.91
	10	47.80	43.86
	20	48.66	44.88
	25	49.13	45.28
	50	50.71	46.69
	75	52.44	48.35
	80	52.95	48.74
	90	53.94	49.84
	95	55.20	50.94
	97	55.91	51.50
	98	56.46	51.81
	99	57.01	52.76

58. CAESAR Name: ELBOW HEIGHT, STANDING, LEFT

ISO Reference No. 4.1.5

ISO Name: Elbow Height

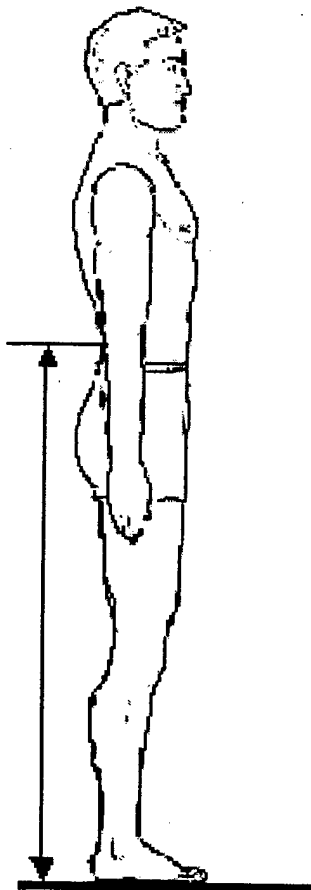
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	1150.27	45.29	1065.18	41.94
SE Mean	2.21	0.09	1.86	0.07
STD	56.10	2.21	48.93	1.93
Minimum	1007.00	39.65	922.00	36.30
Maximum	1306.00	51.42	1222.00	48.11



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1020.00	955.00
	2	1036.00	968.00
	3	1048.00	974.00
	5	1062.00	984.00
	10	1081.00	1002.00
	20	1102.00	1026.00
	25	1110.00	1032.00
	50	1148.00	1063.00
	75	1186.00	1096.00
	80	1198.00	1106.00
	90	1225.00	1128.00
	95	1250.00	1152.00
	97	1264.00	1161.00
	98	1273.00	1169.00
	99	1280.00	1192.00
English (in)			
	1	40.16	37.60
	2	40.79	38.11
	3	41.26	38.35
	5	41.81	38.74
	10	42.56	39.45
	20	43.39	40.39
	25	43.70	40.63
	50	45.20	41.85
	75	46.69	43.15
	80	47.17	43.54
	90	48.23	44.41
	95	49.21	45.35
	97	49.76	45.71
	98	50.12	46.02
	99	50.39	46.93

59. CAESAR Name: ELBOW HEIGHT, STANDING, RIGHT
 ISO Reference No. 4.1.5
 ISO Name: Elbow Height

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	1140.63	44.91	1056.49	41.59
SE Mean	2.18	0.09	1.85	0.07
STD	55.38	2.18	48.77	1.92
Minimum	998.00	39.29	926.00	36.46
Maximum	1292.00	50.87	1209.00	47.60



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1024.00	948.00
	2	1031.00	954.00
	3	1038.00	962.00
	5	1051.00	971.00
	10	1072.00	994.00
	20	1092.00	1018.00
	25	1100.00	1025.00
	50	1140.00	1055.00
	75	1176.00	1088.00
	80	1184.00	1096.00
	90	1220.00	1119.00
	95	1236.00	1138.00
	97	1250.00	1152.00
	98	1255.00	1162.00
	99	1274.00	1180.00
English (in)			
	1	40.31	37.32
	2	40.59	37.56
	3	40.87	37.87
	5	41.38	38.23
	10	42.20	39.13
	20	42.99	40.08
	25	43.31	40.35
	50	44.88	41.54
	75	46.30	42.83
	80	46.61	43.15
	90	48.03	44.06
	95	48.66	44.80
	97	49.21	45.35
	98	49.41	45.75
	99	50.16	46.46

60. CAESAR Name: FOOT BREADTH, LEFT

ISO Reference No. 4.3.8

ISO Name: Foot Breadth

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	106.30	4.19	95.22	3.75
SE Mean	0.24	0.01	0.25	0.01
STD	6.20	0.24	6.52	0.26
Minimum	88.87	3.50	72.46	2.85
Maximum	128.59	5.06	114.86	4.52



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	92.75	78.65
	2	93.69	81.35
	3	94.66	83.12
	5	96.17	84.26
	10	98.79	87.38
	20	101.06	90.01
	25	102.07	90.82
	50	106.17	95.22
	75	110.37	99.85
	80	111.44	100.66
	90	114.24	103.18
	95	116.34	105.66
	97	118.79	107.10
	98	120.19	108.08
	99	121.78	110.16
English (in)			
	1	3.65	3.10
	2	3.69	3.20
	3	3.73	3.27
	5	3.79	3.32
	10	3.89	3.44
	20	3.98	3.54
	25	4.02	3.58
	50	4.18	3.75
	75	4.35	3.93
	80	4.39	3.96
	90	4.50	4.06
	95	4.58	4.16
	97	4.68	4.22
	98	4.73	4.26
	99	4.79	4.34

61. CAESAR Name: FOOT BREADTH, RIGHT
 ISO Reference No. 4.3.8
 ISO Name: Foot Breadth

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	103.72	4.08	92.11	3.63
SE Mean	0.29	0.01	0.27	0.01
STD	7.27	0.29	7.12	0.28
Minimum	72.08	2.84	58.30	2.30
Maximum	131.01	5.16	112.26	4.42



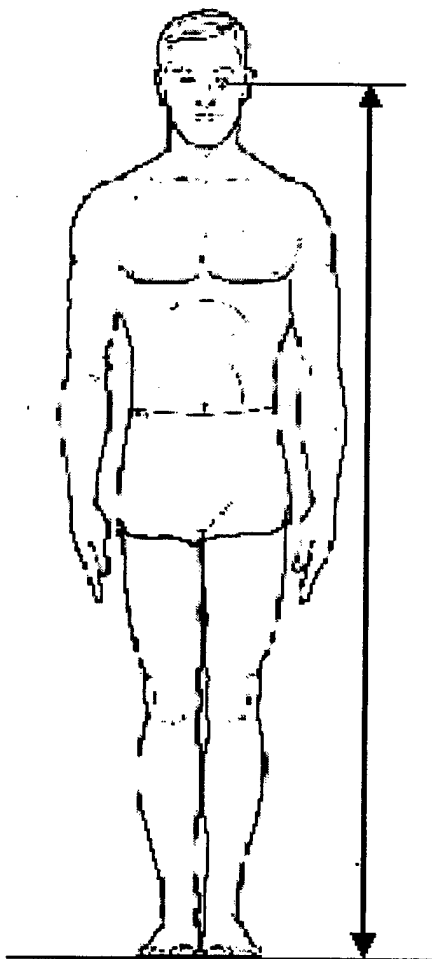
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	88.13	74.45
	2	89.43	76.18
	3	90.22	78.02
	5	92.46	80.96
	10	94.17	83.00
	20	97.30	86.38
	25	98.74	87.82
	50	103.86	92.59
	75	108.62	96.52
	80	110.09	97.70
	90	112.65	100.50
	95	115.15	103.42
	97	116.90	105.90
	98	117.87	107.42
	99	119.99	109.08
English (in)			
	1	3.47	2.93
	2	3.52	3.00
	3	3.55	3.07
	5	3.64	3.19
	10	3.71	3.27
	20	3.83	3.40
	25	3.89	3.46
	50	4.09	3.65
	75	4.28	3.80
	80	4.33	3.85
	90	4.44	3.96
	95	4.53	4.07
	97	4.60	4.17
	98	4.64	4.23
	99	4.72	4.29

62. CAESAR Name: INFRAORBITALE HEIGHT, STANDING, LEFT

ISO Reference No. N/A

ISO Name:

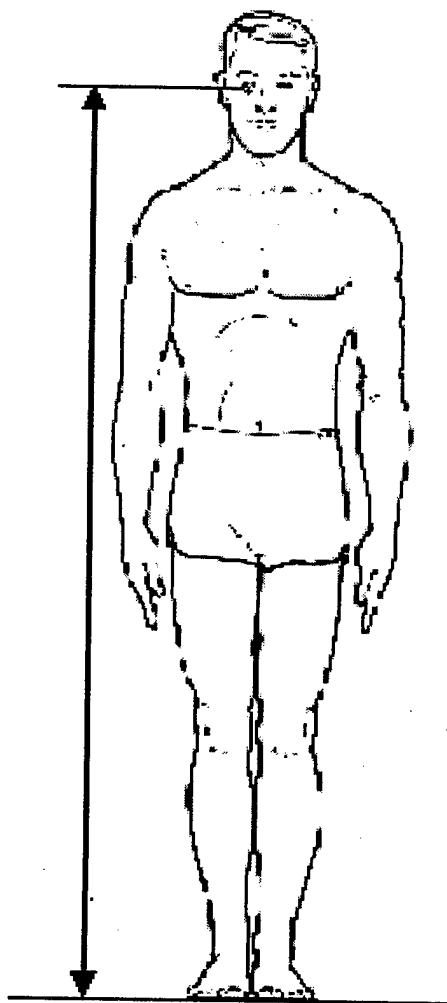
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	693.00	693.00
Weighted Size	643.96	643.96	691.50	691.50
Mean	1644.19	64.73	1516.67	59.71
SE Mean	3.01	0.12	2.56	0.10
STD	76.55	3.01	67.45	2.66
Minimum	1424.00	56.06	1332.00	52.44
Maximum	1854.00	72.99	1752.00	68.98



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1474.00	1360.00
	2	1492.00	1386.00
	3	1506.00	1392.00
	5	1530.00	1406.00
	10	1551.00	1432.00
	20	1578.00	1458.00
	25	1590.00	1470.00
	50	1642.00	1514.00
	75	1694.00	1562.00
	80	1706.00	1572.00
	90	1748.00	1606.00
	95	1776.00	1630.00
	97	1794.00	1648.00
	98	1818.00	1662.00
	99	1831.00	1686.00
English (in)			
	1	58.03	53.54
	2	58.74	54.57
	3	59.29	54.80
	5	60.24	55.35
	10	61.06	56.38
	20	62.13	57.40
	25	62.60	57.87
	50	64.65	59.61
	75	66.69	61.50
	80	67.17	61.89
	90	68.82	63.23
	95	69.92	64.17
	97	70.63	64.88
	98	71.57	65.43
	99	72.09	66.38

63. CAESAR Name: INFRAORBITALE HEIGHT, STANDING, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	1644.00	64.72	1516.29	59.70
SE Mean	3.02	0.12	2.57	0.10
STD	76.61	3.02	67.78	2.67
Minimum	1424.00	56.06	1330.00	52.36
Maximum	1854.00	72.99	1752.00	68.98



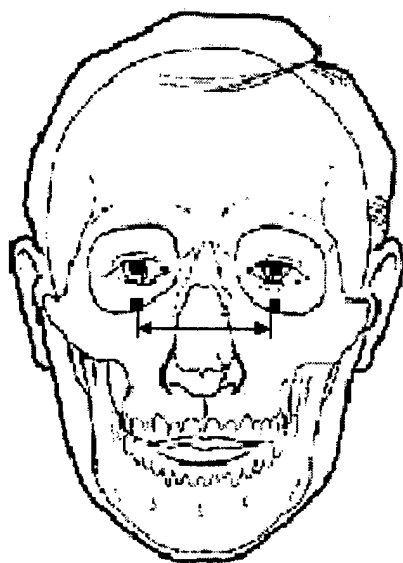
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1476.00	1360.00
	2	1490.00	1386.00
	3	1504.00	1391.00
	5	1528.00	1406.00
	10	1550.00	1432.00
	20	1576.00	1458.00
	25	1590.00	1470.00
	50	1640.00	1514.00
	75	1694.00	1560.00
	80	1708.00	1572.00
	90	1750.00	1606.00
	95	1776.00	1630.00
	97	1796.00	1650.00
	98	1824.00	1664.00
	99	1834.00	1690.00
English (in)			
	1	58.11	53.54
	2	58.66	54.57
	3	59.21	54.76
	5	60.16	55.35
	10	61.02	56.38
	20	62.05	57.40
	25	62.60	57.87
	50	64.57	59.61
	75	66.69	61.42
	80	67.24	61.89
	90	68.90	63.23
	95	69.92	64.17
	97	70.71	64.96
	98	71.81	65.51
	99	72.20	66.54

64. CAESAR Name: INTER-PUPILLARY DISTANCE

ISO Reference No. N/A

ISO Name:

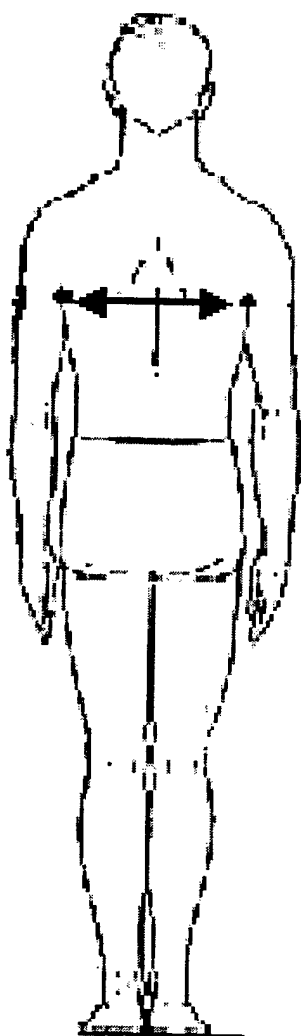
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	693.00	693.00
Weighted Size	643.96	643.96	691.50	691.50
Mean	66.92	2.63	65.53	2.58
SE Mean	0.21	0.01	0.21	0.01
STD	5.34	0.21	5.43	0.21
Minimum	49.66	1.96	48.26	1.90
Maximum	83.24	3.28	83.37	3.28



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	53.60	52.64
	2	56.69	54.27
	3	57.13	55.45
	5	58.23	56.66
	10	60.03	58.89
	20	62.41	60.95
	25	63.29	62.04
	50	67.07	65.18
	75	70.38	69.10
	80	71.15	69.98
	90	73.76	72.49
	95	75.77	74.56
	97	76.92	76.03
	98	77.74	77.24
	99	79.56	78.67
English (in)			
	1	2.11	2.07
	2	2.23	2.14
	3	2.25	2.18
	5	2.29	2.23
	10	2.36	2.32
	20	2.46	2.40
	25	2.49	2.44
	50	2.64	2.57
	75	2.77	2.72
	80	2.80	2.75
	90	2.90	2.85
	95	2.98	2.94
	97	3.03	2.99
	98	3.06	3.04
	99	3.13	3.10

65. CAESAR Name: INTERSCYE DISTANCE
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	643.00	643.00	692.00	692.00
Weighted Size	641.80	641.80	690.44	690.44
Mean	392.37	15.45	350.91	13.82
SE Mean	0.90	0.04	0.83	0.03
STD	22.86	0.90	21.83	0.86
Minimum	322.24	12.69	295.36	11.63
Maximum	460.50	18.13	420.48	16.55



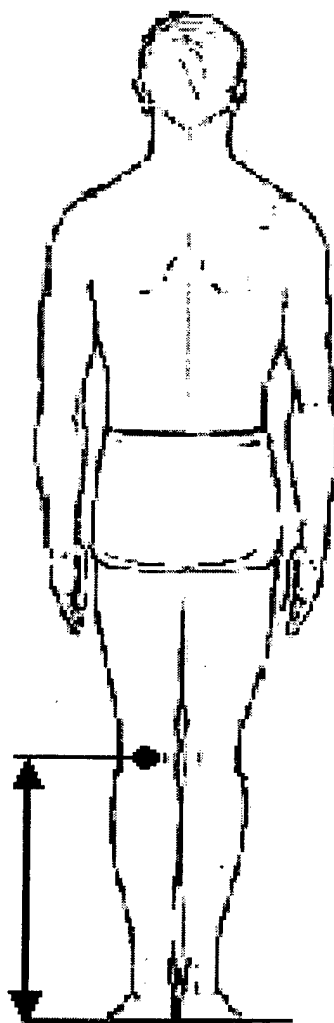
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	343.13	302.39
	2	346.15	307.39
	3	349.14	311.13
	5	354.39	315.67
	10	362.11	324.02
	20	372.45	333.58
	25	376.07	336.65
	50	392.60	349.94
	75	407.02	363.70
	80	411.79	367.45
	90	422.80	379.17
	95	428.43	390.98
	97	432.94	397.01
	98	440.88	400.22
	99	442.88	406.22
English (in)			
	1	13.51	11.91
	2	13.63	12.10
	3	13.75	12.25
	5	13.95	12.43
	10	14.26	12.76
	20	14.66	13.13
	25	14.81	13.25
	50	15.46	13.78
	75	16.02	14.32
	80	16.21	14.47
	90	16.65	14.93
	95	16.87	15.39
	97	17.04	15.63
	98	17.36	15.76
	99	17.44	15.99

66. CAESAR Name: KNEE HEIGHT, STANDING, LEFT

ISO Reference No. N/A

ISO Name:

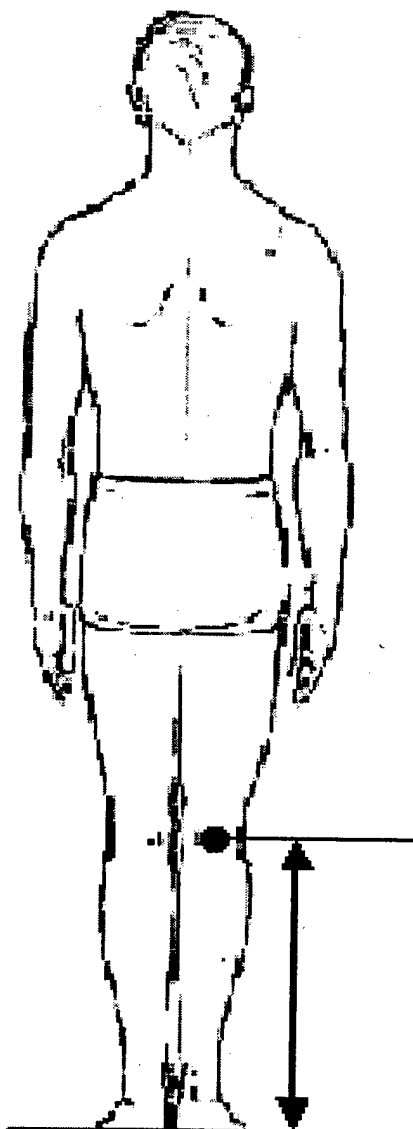
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	498.74	19.64	449.42	17.69
SE Mean	1.12	0.04	0.97	0.04
STD	28.52	1.12	25.58	1.01
Minimum	414.00	16.30	384.00	15.12
Maximum	598.00	23.54	552.00	21.73



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	436.00	398.00
	2	446.00	402.00
	3	448.00	404.00
	5	454.00	410.00
	10	464.00	418.00
	20	474.00	428.00
	25	480.00	430.00
	50	496.00	448.00
	75	518.00	466.00
	80	522.00	470.00
	90	534.00	482.00
	95	546.00	494.00
	97	558.00	502.00
	98	562.00	504.00
	99	568.00	518.00
English (in)			
	1	17.17	15.67
	2	17.56	15.83
	3	17.64	15.91
	5	17.87	16.14
	10	18.27	16.46
	20	18.66	16.85
	25	18.90	16.93
	50	19.53	17.64
	75	20.39	18.35
	80	20.55	18.50
	90	21.02	18.98
	95	21.50	19.45
	97	21.97	19.76
	98	22.13	19.84
	99	22.36	20.39

67. CAESAR Name: KNEE HEIGHT, STANDING, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	498.26	19.62	448.87	17.67
SE Mean	1.12	0.04	0.96	0.04
STD	28.34	1.12	25.40	1.00
Minimum	414.00	16.30	384.00	15.12
Maximum	596.00	23.46	540.00	21.26



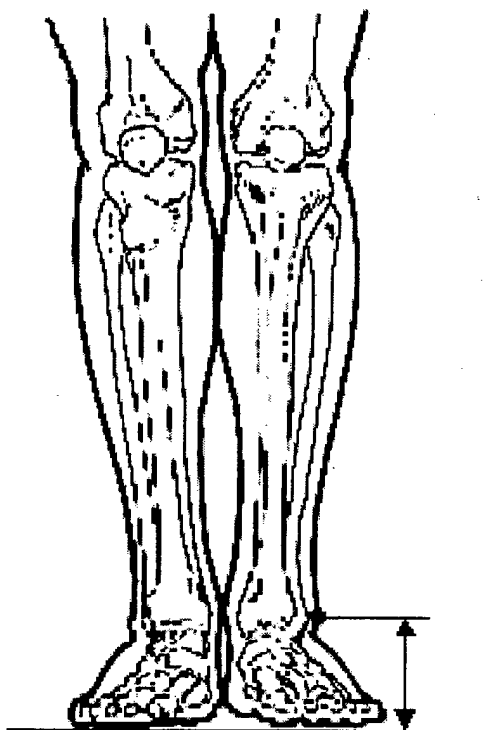
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	436.00	398.00
	2	444.00	400.00
	3	448.00	404.00
	5	452.00	408.00
	10	464.00	416.00
	20	474.00	428.00
	25	480.00	430.00
	50	496.00	448.00
	75	517.00	466.00
	80	522.00	468.00
	90	534.00	482.00
	95	548.00	492.00
	97	558.00	500.00
	98	562.00	508.00
	99	574.00	512.00
English (in)			
	1	17.17	15.67
	2	17.48	15.75
	3	17.64	15.91
	5	17.80	16.06
	10	18.27	16.38
	20	18.66	16.85
	25	18.90	16.93
	50	19.53	17.64
	75	20.35	18.35
	80	20.55	18.43
	90	21.02	18.98
	95	21.57	19.37
	97	21.97	19.69
	98	22.13	20.00
	99	22.60	20.16

68. CAESAR Name: MALLEOLUS HEIGHT, LATERAL, LEFT

ISO Reference No. N/A

ISO Name:

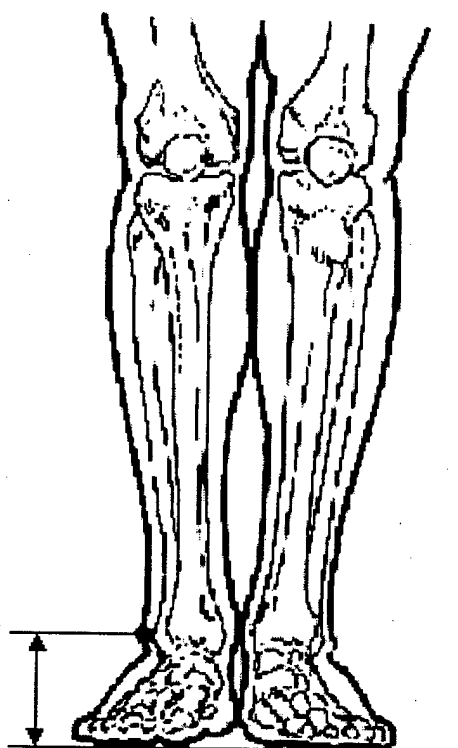
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	72.67	2.86	67.00	2.64
SE Mean	0.25	0.01	0.22	0.01
STD	6.39	0.25	5.82	0.23
Minimum	50.00	1.97	50.00	1.97
Maximum	94.00	3.70	88.00	3.46



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	58.00	54.00
	2	60.00	54.00
	3	62.00	56.00
	5	62.00	58.00
	10	64.00	60.00
	20	68.00	62.00
	25	68.00	62.00
	50	72.00	66.00
	75	78.00	72.00
	80	78.00	72.00
	90	82.00	74.00
	95	84.00	76.00
	97	86.00	78.00
	98	86.00	78.00
	99	88.00	80.00
English (in)			
	1	2.28	2.13
	2	2.36	2.13
	3	2.44	2.20
	5	2.44	2.28
	10	2.52	2.36
	20	2.68	2.44
	25	2.68	2.44
	50	2.83	2.60
	75	3.07	2.83
	80	3.07	2.83
	90	3.23	2.91
	95	3.31	2.99
	97	3.39	3.07
	98	3.39	3.07
	99	3.46	3.15

69. CAESAR Name: MALLEOLUS HEIGHT, LATERAL, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	71.84	2.83	65.12	2.56
SE Mean	0.25	0.01	0.23	0.01
STD	6.46	0.25	6.02	0.24
Minimum	50.00	1.97	46.00	1.81
Maximum	92.00	3.62	88.00	3.46



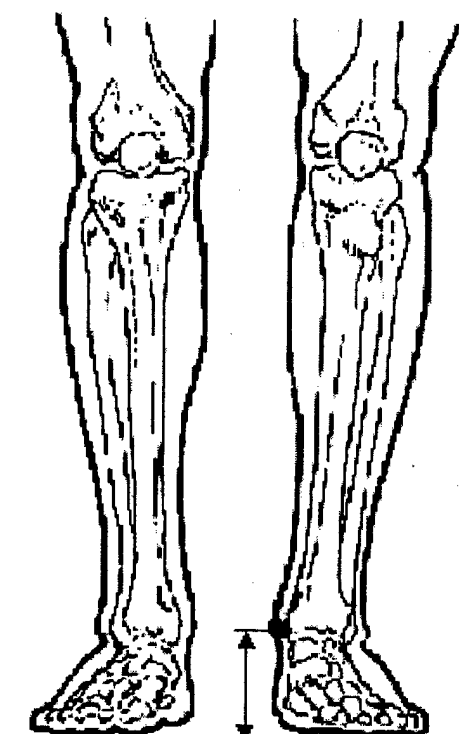
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	56.00	52.00
	2	58.00	54.00
	3	60.00	54.00
	5	62.00	56.00
	10	64.00	58.00
	20	66.00	60.00
	25	68.00	60.00
	50	72.00	64.00
	75	76.00	70.00
	80	76.00	70.00
	90	80.00	72.00
	95	84.00	74.00
	97	84.00	76.00
	98	86.00	78.00
	99	88.00	78.00
English (in)			
	1	2.20	2.05
	2	2.28	2.13
	3	2.36	2.13
	5	2.44	2.20
	10	2.52	2.28
	20	2.60	2.36
	25	2.68	2.36
	50	2.83	2.52
	75	2.99	2.76
	80	2.99	2.76
	90	3.15	2.83
	95	3.31	2.91
	97	3.31	2.99
	98	3.39	3.07
	99	3.46	3.07

70. CAESAR Name: MALLEOLUS HEIGHT, MEDIAL, LEFT

ISO Reference No. N/A

ISO Name:

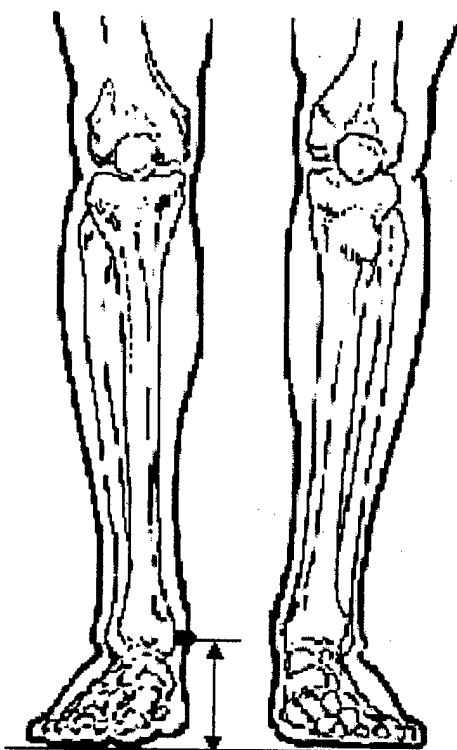
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	86.29	3.40	77.02	3.03
SE Mean	0.28	0.01	0.25	0.01
STD	7.09	0.28	6.53	0.26
Minimum	34.00	1.34	58.00	2.28
Maximum	106.00	4.17	96.00	3.78



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	68.00	62.00
	2	72.00	64.00
	3	74.00	64.00
	5	76.00	66.00
	10	78.00	68.00
	20	80.00	72.00
	25	82.00	72.00
	50	86.00	78.00
	75	90.00	82.00
	80	92.00	82.00
	90	94.00	86.00
	95	98.00	88.00
	97	100.00	88.00
	98	100.00	90.00
	99	104.00	90.00
English (in)			
	1	2.68	2.44
	2	2.83	2.52
	3	2.91	2.52
	5	2.99	2.60
	10	3.07	2.68
	20	3.15	2.83
	25	3.23	2.83
	50	3.39	3.07
	75	3.54	3.23
	80	3.62	3.23
	90	3.70	3.39
	95	3.86	3.46
	97	3.94	3.46
	98	3.94	3.54
	99	4.09	3.54

71. CAESAR Name: MALLEOLUS HEIGHT, MEDIAL, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	87.85	3.46	78.28	3.08
SE Mean	0.29	0.01	0.27	0.01
STD	7.39	0.29	6.98	0.27
Minimum	46.00	1.81	57.00	2.24
Maximum	112.00	4.41	97.00	3.82



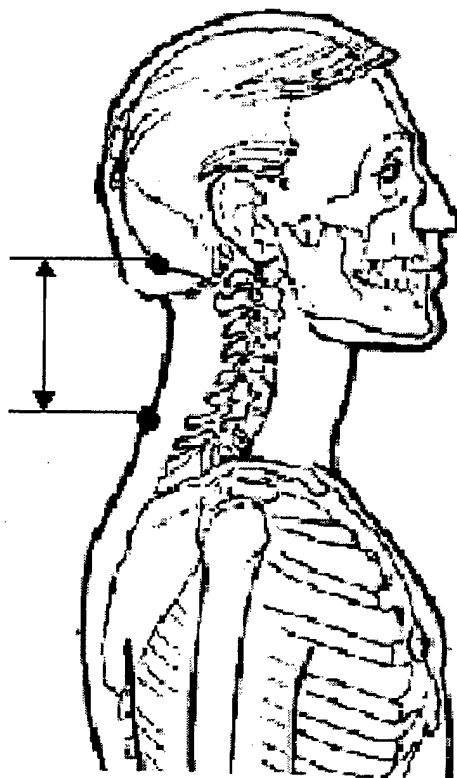
	Percentiles	MEN Quantile	WOMEN Quantile
Metric (mm)			
	1	70.00	60.00
	2	73.00	62.00
	3	74.00	64.00
	5	76.00	66.00
	10	78.00	68.00
	20	82.00	73.00
	25	83.00	74.00
	50	88.00	78.00
	75	92.00	84.00
	80	94.00	84.00
	90	96.00	86.00
	95	100.00	90.00
	97	102.00	90.00
	98	102.00	92.00
	99	106.00	92.00
English (in)			
	1	2.76	2.36
	2	2.87	2.44
	3	2.91	2.52
	5	2.99	2.60
	10	3.07	2.68
	20	3.23	2.87
	25	3.27	2.91
	50	3.46	3.07
	75	3.62	3.31
	80	3.70	3.31
	90	3.78	3.39
	95	3.94	3.54
	97	4.02	3.54
	98	4.02	3.62
	99	4.17	3.62

72. CAESAR Name: NECK HEIGHT

ISO Reference No. N/A

ISO Name:

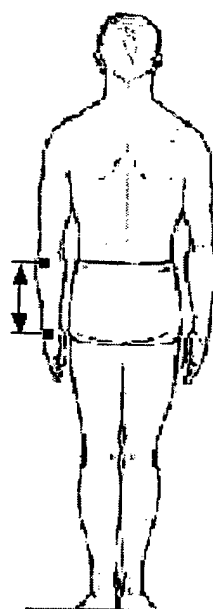
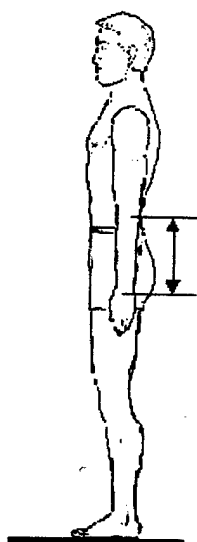
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	642.00	642.00	689.00	689.00
Weighted Size	641.32	641.32	686.18	686.18
Mean	97.63	3.84	96.52	3.80
SE Mean	0.72	0.03	0.60	0.02
STD	18.25	0.72	15.65	0.62
Minimum	43.49	1.71	51.01	2.01
Maximum	156.80	6.17	144.38	5.68



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	54.40	58.42
	2	58.01	64.27
	3	60.61	66.05
	5	66.88	70.66
	10	74.08	75.32
	20	82.34	83.45
	25	85.00	86.27
	50	98.38	96.75
	75	110.12	106.70
	80	113.33	109.40
	90	120.73	116.45
	95	126.91	122.26
	97	129.91	125.81
	98	131.24	128.42
	99	136.90	134.67
English (in)			
	1	2.14	2.30
	2	2.28	2.53
	3	2.39	2.60
	5	2.63	2.78
	10	2.92	2.97
	20	3.24	3.29
	25	3.35	3.40
	50	3.87	3.81
	75	4.34	4.20
	80	4.46	4.31
	90	4.75	4.58
	95	5.00	4.81
	97	5.11	4.95
	98	5.17	5.06
	99	5.39	5.30

73. CAESAR Name: RADIALE-STYLION LENGTH, LEFT
 ISO Reference No. N/A
 ISO Name:

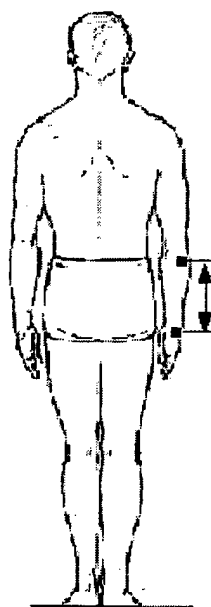
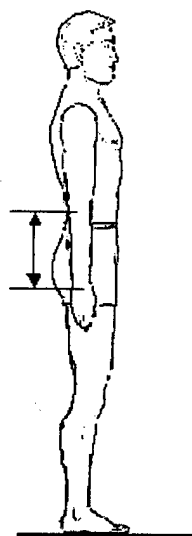
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	644.00	644.00	694.00	694.00
Weighted Size	642.88	642.88	692.32	692.32
Mean	267.10	10.52	241.75	9.52
SE Mean	0.62	0.02	0.58	0.02
STD	15.68	0.62	15.29	0.60
Minimum	215.97	8.50	200.19	7.88
Maximum	317.87	12.51	289.34	11.39



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	233.12	209.42
	2	236.74	213.96
	3	239.48	215.47
	5	243.30	217.82
	10	248.18	223.11
	20	254.14	228.33
	25	256.65	230.59
	50	266.13	240.73
	75	277.53	252.03
	80	280.08	254.84
	90	287.16	262.57
	95	294.20	268.24
	97	297.71	271.91
	98	301.90	274.24
	99	305.48	278.51
English (in)			
	1	9.18	8.24
	2	9.32	8.42
	3	9.43	8.48
	5	9.58	8.58
	10	9.77	8.78
	20	10.01	8.99
	25	10.10	9.08
	50	10.48	9.48
	75	10.93	9.92
	80	11.03	10.03
	90	11.31	10.34
	95	11.58	10.56
	97	11.72	10.71
	98	11.89	10.80
	99	12.03	10.96

74. CAESAR Name: RADIALE-STYLION LENGTH, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	264.74	10.42	237.91	9.37
SE Mean	0.60	0.02	0.59	0.02
STD	15.26	0.60	15.46	0.61
Minimum	219.97	8.66	187.37	7.38
Maximum	311.61	12.27	298.95	11.77



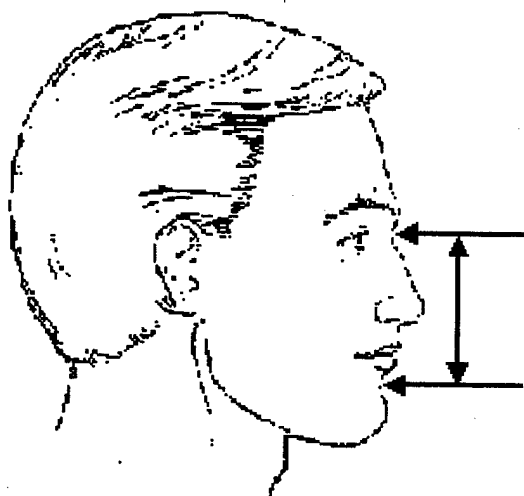
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	231.92	204.12
	2	236.50	209.14
	3	238.63	212.76
	5	241.05	215.26
	10	245.08	219.57
	20	252.18	225.00
	25	254.61	227.73
	50	263.80	236.20
	75	274.75	247.55
	80	277.48	251.07
	90	284.32	259.14
	95	291.19	263.37
	97	294.17	267.58
	98	298.47	270.04
	99	304.33	277.72
English (in)			
	1	9.13	8.04
	2	9.31	8.23
	3	9.39	8.38
	5	9.49	8.47
	10	9.65	8.64
	20	9.93	8.86
	25	10.02	8.97
	50	10.39	9.30
	75	10.82	9.75
	80	10.92	9.88
	90	11.19	10.20
	95	11.46	10.37
	97	11.58	10.53
	98	11.75	10.63
	99	11.98	10.93

75. CAESAR Name: SELLION-SUPRAMENTON LENGTH

ISO Reference No. N/A

ISO Name:

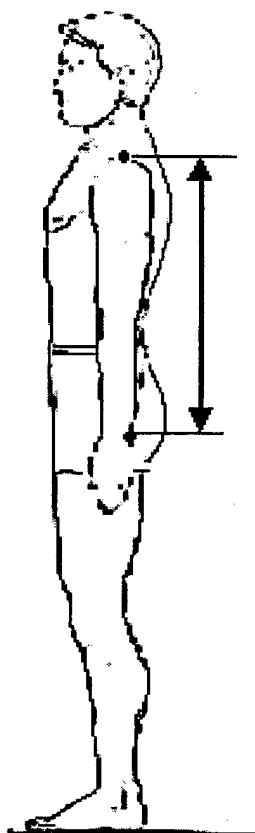
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	644.00	644.00	694.00	694.00
Weighted Size	642.88	642.88	692.32	692.32
Mean	99.39	3.91	91.94	3.62
SE Mean	0.28	0.01	0.23	0.01
STD	7.06	0.28	6.12	0.24
Minimum	81.94	3.23	67.93	2.67
Maximum	124.03	4.88	110.17	4.34



	Percentiles	MEN Quantile	WOMEN Quantile
Metric (mm)			
	1	84.02	78.62
	2	85.52	80.18
	3	86.99	80.70
	5	88.67	82.17
	10	91.18	84.22
	20	94.01	86.58
	25	94.25	87.85
	50	98.57	92.13
	75	104.12	96.12
	80	104.88	96.67
	90	108.47	100.15
	95	112.30	102.16
	97	114.39	104.01
	98	115.64	104.51
	99	118.22	106.53
English (in)			
	1	3.31	3.10
	2	3.37	3.16
	3	3.42	3.18
	5	3.49	3.23
	10	3.59	3.32
	20	3.70	3.41
	25	3.71	3.46
	50	3.88	3.63
	75	4.10	3.78
	80	4.13	3.81
	90	4.27	3.94
	95	4.42	4.02
	97	4.50	4.10
	98	4.55	4.11
	99	4.65	4.19

76. CAESAR Name: SLEEVE OUTSEAM LENGTH, LEFT
 ISO Reference No. N/A
 ISO Name:

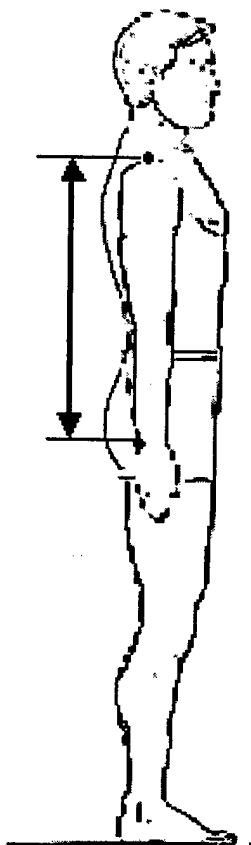
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	693.00	693.00
Weighted Size	643.96	643.96	691.38	691.38
Mean	581.96	22.91	527.44	20.77
SE Mean	1.23	0.05	1.10	0.04
STD	31.34	1.23	29.03	1.14
Minimum	490.14	19.30	448.18	17.64
Maximum	691.63	27.23	620.01	24.41



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	514.98	470.74
	2	520.45	473.67
	3	524.63	476.43
	5	528.86	481.58
	10	542.13	490.59
	20	557.17	502.43
	25	561.79	506.15
	50	580.88	527.21
	75	600.76	546.45
	80	608.76	551.28
	90	623.11	564.74
	95	635.68	575.53
	97	642.15	587.25
	98	649.51	592.69
	99	662.49	602.67
English (in)			
	1	20.27	18.53
	2	20.49	18.65
	3	20.65	18.76
	5	20.82	18.96
	10	21.34	19.31
	20	21.94	19.78
	25	22.12	19.93
	50	22.87	20.76
	75	23.65	21.51
	80	23.97	21.70
	90	24.53	22.23
	95	25.03	22.66
	97	25.28	23.12
	98	25.57	23.33
	99	26.08	23.73

77. CAESAR Name: SLEEVE OUTSEAM LENGTH, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	693.00	693.00
Weighted Size	643.96	643.96	691.38	691.38
Mean	583.82	22.99	529.33	20.84
SE Mean	1.20	0.05	1.09	0.04
STD	30.49	1.20	28.75	1.13
Minimum	494.30	19.46	452.23	17.80
Maximum	676.25	26.62	625.66	24.63



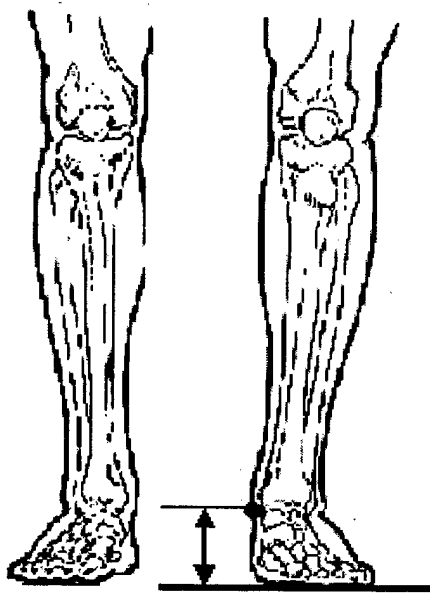
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	516.90	467.28
	2	524.30	476.92
	3	527.88	481.77
	5	533.50	486.67
	10	544.94	492.19
	20	557.64	505.64
	25	563.38	509.04
	50	583.99	527.19
	75	603.03	547.45
	80	609.06	552.23
	90	623.72	567.91
	95	635.56	578.91
	97	643.85	589.99
	98	647.27	595.55
	99	657.88	601.34
English (in)			
	1	20.35	18.40
	2	20.64	18.78
	3	20.78	18.97
	5	21.00	19.16
	10	21.45	19.38
	20	21.95	19.91
	25	22.18	20.04
	50	22.99	20.76
	75	23.74	21.55
	80	23.98	21.74
	90	24.56	22.36
	95	25.02	22.79
	97	25.35	23.23
	98	25.48	23.45
	99	25.90	23.67

78. CAESAR Name: SPHYRION HEIGHT, LEFT

ISO Reference No. N/A

ISO Name:

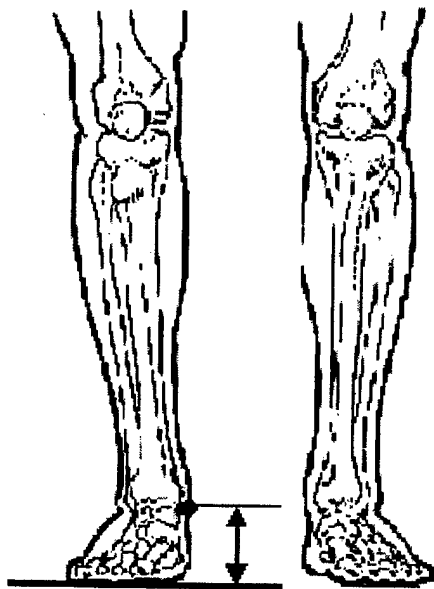
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	67.29	2.65	58.90	2.32
SE Mean	0.29	0.01	0.26	0.01
STD	7.34	0.29	6.76	0.27
Minimum	5.00	0.20	40.00	1.57
Maximum	92.00	3.62	78.00	3.07



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	48.00	44.00
	2	52.00	44.00
	3	54.00	46.00
	5	56.00	48.00
	10	58.00	50.00
	20	62.00	52.00
	25	62.00	54.00
	50	68.00	60.00
	75	72.00	64.00
	80	74.00	64.00
	90	76.00	68.00
	95	78.00	70.00
	97	80.00	70.00
	98	82.00	72.00
	99	84.00	72.00
English (in)			
	1	1.89	1.73
	2	2.05	1.73
	3	2.13	1.81
	5	2.20	1.89
	10	2.28	1.97
	20	2.44	2.05
	25	2.44	2.13
	50	2.68	2.36
	75	2.83	2.52
	80	2.91	2.52
	90	2.99	2.68
	95	3.07	2.76
	97	3.15	2.76
	98	3.23	2.83
	99	3.31	2.83

79. CAESAR Name: SPHYRION HEIGHT, RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	68.76	2.71	59.95	2.36
SE Mean	0.31	0.01	0.28	0.01
STD	7.78	0.31	7.25	0.29
Minimum	17.00	0.67	39.00	1.54
Maximum	94.00	3.70	78.00	3.07



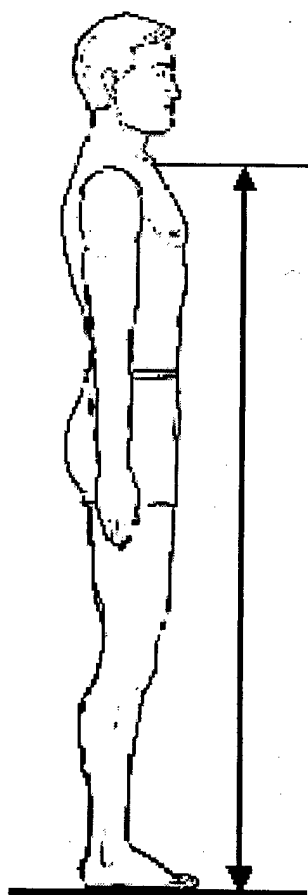
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	50.00	42.00
	2	53.00	44.00
	3	54.00	46.00
	5	56.00	47.00
	10	60.00	50.00
	20	62.00	54.00
	25	64.00	55.00
	50	70.00	60.00
	75	74.00	64.00
	80	76.00	66.00
	90	78.00	68.00
	95	80.00	70.00
	97	82.00	72.00
	98	84.00	74.00
	99	86.00	76.00
English (in)			
	1	1.97	1.65
	2	2.09	1.73
	3	2.13	1.81
	5	2.20	1.85
	10	2.36	1.97
	20	2.44	2.13
	25	2.52	2.17
	50	2.76	2.36
	75	2.91	2.52
	80	2.99	2.60
	90	3.07	2.68
	95	3.15	2.76
	97	3.23	2.83
	98	3.31	2.91
	99	3.39	2.99

80. CAESAR Name: SUPRASTERNALE HEIGHT

ISO Reference No. N/A

ISO Name:

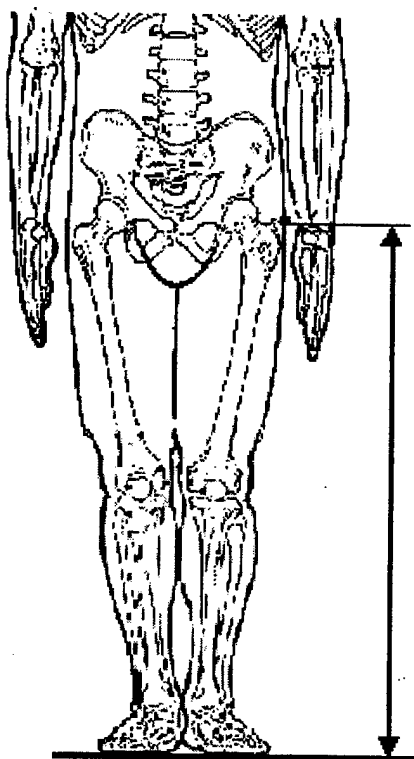
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.96	643.96	692.32	692.32
Mean	1451.19	57.13	1337.07	52.64
SE Mean	2.70	0.11	2.28	0.09
STD	68.46	2.70	59.94	2.36
Minimum	1264.00	49.76	1168.00	45.98
Maximum	1646.00	64.80	1548.00	60.94



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	1294.00	1205.00
	2	1314.00	1212.00
	3	1333.00	1232.00
	5	1352.00	1238.00
	10	1368.00	1262.00
	20	1391.00	1287.00
	25	1406.00	1300.00
	50	1448.00	1336.00
	75	1496.00	1377.00
	80	1506.00	1385.00
	90	1542.00	1414.00
	95	1568.00	1440.00
	97	1592.00	1452.00
	98	1612.00	1462.00
	99	1628.00	1491.00
English (in)			
	1	50.94	47.44
	2	51.73	47.72
	3	52.48	48.50
	5	53.23	48.74
	10	53.86	49.69
	20	54.76	50.67
	25	55.35	51.18
	50	57.01	52.60
	75	58.90	54.21
	80	59.29	54.53
	90	60.71	55.67
	95	61.73	56.69
	97	62.68	57.17
	98	63.46	57.56
	99	64.09	58.70

81. CAESAR Name: TROCHANTER HEIGHT, LEFT
 ISO Reference No. N/A
 ISO Name:

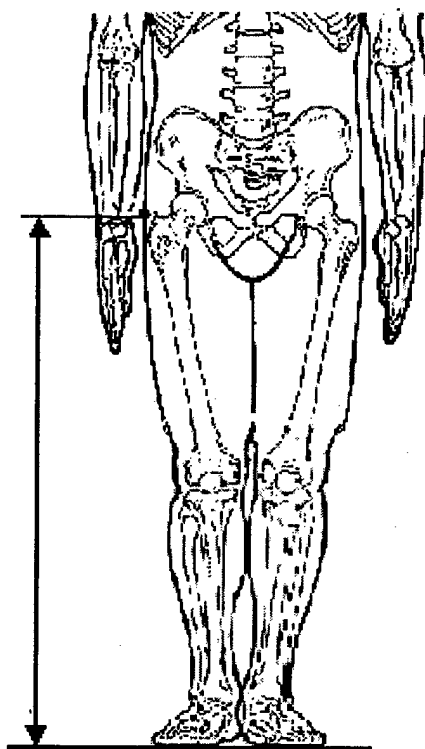
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	691.00	691.00
Weighted Size	643.96	643.96	689.50	689.50
Mean	949.43	37.38	879.83	34.64
SE Mean	2.07	0.08	1.82	0.07
STD	52.62	2.07	47.92	1.89
Minimum	800.00	31.50	742.00	29.21
Maximum	1100.00	43.31	1062.00	41.81



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	836.00	782.00
	2	848.00	790.00
	3	856.00	794.00
	5	868.00	802.00
	10	882.00	820.00
	20	906.00	836.00
	25	912.00	844.00
	50	948.00	880.00
	75	984.00	912.00
	80	994.00	922.00
	90	1018.00	942.00
	95	1040.00	958.00
	97	1056.00	970.00
	98	1066.00	976.00
	99	1084.00	1006.00
English (in)			
	1	32.91	30.79
	2	33.39	31.10
	3	33.70	31.26
	5	34.17	31.57
	10	34.72	32.28
	20	35.67	32.91
	25	35.91	33.23
	50	37.32	34.65
	75	38.74	35.91
	80	39.13	36.30
	90	40.08	37.09
	95	40.94	37.72
	97	41.57	38.19
	98	41.97	38.43
	99	42.68	39.61

82. CAESAR Name: TROCHANTER HEIGHT, RIGHT
 ISO Reference No. N/A
 ISO Name:

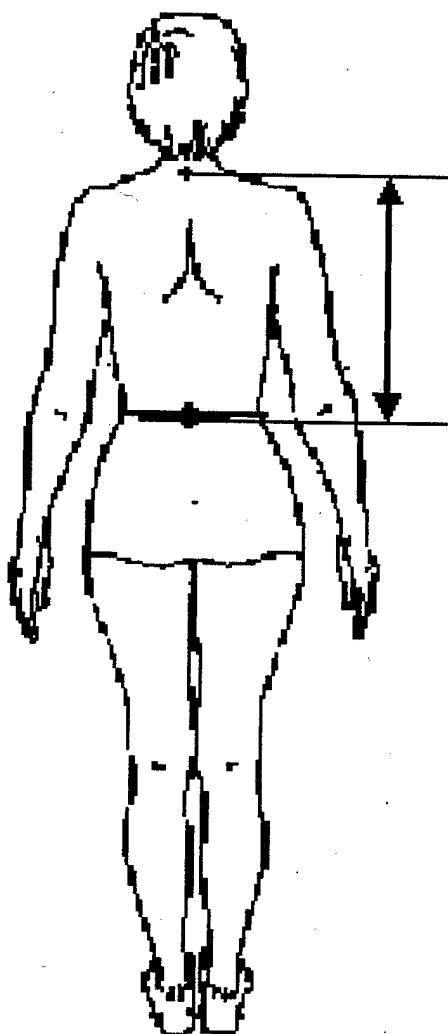
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	691.00	691.00
Weighted Size	643.96	643.96	689.50	689.50
Mean	947.66	37.31	879.67	34.63
SE Mean	2.05	0.08	1.83	0.07
STD	52.11	2.05	48.08	1.89
Minimum	810.00	31.89	752.00	29.61
Maximum	1112.00	43.78	1066.00	41.97



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	828.00	774.00
	2	848.00	782.00
	3	858.00	792.00
	5	866.00	804.00
	10	884.00	816.00
	20	904.00	838.00
	25	910.00	844.00
	50	946.00	880.00
	75	982.00	912.00
	80	992.00	920.00
	90	1016.00	940.00
	95	1040.00	960.00
	97	1050.00	970.00
	98	1064.00	974.00
	99	1072.00	994.00
English (in)			
	1	32.60	30.47
	2	33.39	30.79
	3	33.78	31.18
	5	34.09	31.65
	10	34.80	32.13
	20	35.59	32.99
	25	35.83	33.23
	50	37.24	34.65
	75	38.66	35.91
	80	39.06	36.22
	90	40.00	37.01
	95	40.94	37.80
	97	41.34	38.19
	98	41.89	38.35
	99	42.20	39.13

83. CAESAR Name: WAIST BACK (CERVICALE TO WAIST) LENGTH
ISO Reference No. N/A
ISO Name:

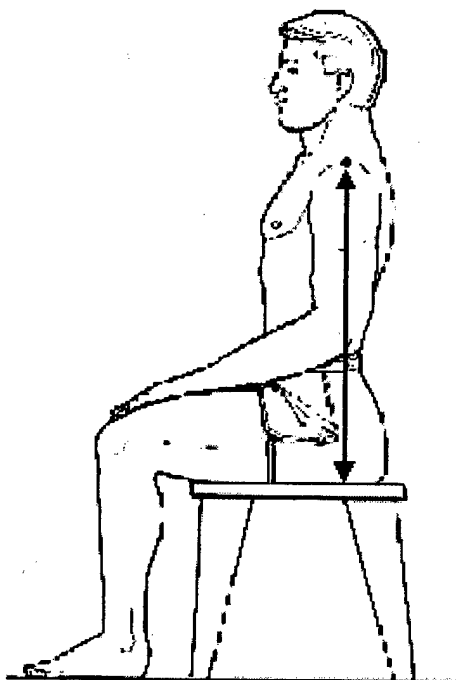
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	693.00	693.00
Weighted Size	643.96	643.96	690.66	690.66
Mean	482.60	19.00	398.87	15.70
SE Mean	1.26	0.05	1.06	0.04
STD	32.06	1.26	27.87	1.10
Minimum	367.25	14.46	332.73	13.10
Maximum	591.89	23.30	526.22	20.72



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	410.14	342.10
	2	422.28	346.54
	3	426.82	348.56
	5	431.39	353.41
	10	443.18	365.74
	20	454.23	376.13
	25	461.10	380.01
	50	483.04	396.98
	75	503.40	415.71
	80	509.40	420.93
	90	520.26	436.65
	95	535.14	446.01
	97	546.86	456.24
	98	551.84	463.62
	99	561.93	474.50
English (in)			
	1	16.15	13.47
	2	16.63	13.64
	3	16.80	13.72
	5	16.98	13.91
	10	17.45	14.40
	20	17.88	14.81
	25	18.15	14.96
	50	19.02	15.63
	75	19.82	16.37
	80	20.06	16.57
	90	20.48	17.19
	95	21.07	17.56
	97	21.53	17.96
	98	21.73	18.25
	99	22.12	18.68

84. CAESAR Name: ACROMIAL HEIGHT, SITTING (COMFORTABLE), LEFT
 ISO Reference No. N/A
 ISO Name:

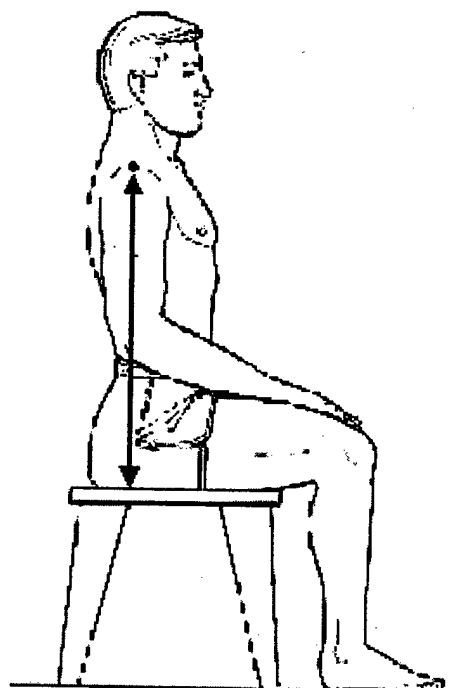
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	643.00	643.00	693.00	693.00
Weighted Size	642.40	642.40	691.38	691.38
Mean	602.37	23.72	565.19	22.25
SE Mean	1.41	0.06	1.18	0.05
STD	35.72	1.41	31.07	1.22
Minimum	485.00	19.09	471.00	18.54
Maximum	705.00	27.76	677.00	26.65



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	519.00	489.00
	2	530.00	509.00
	3	534.00	512.00
	5	545.00	517.00
	10	559.00	527.00
	20	571.00	538.00
	25	577.00	543.00
	50	602.00	563.00
	75	627.00	587.00
	80	633.00	593.00
	90	649.00	605.00
	95	659.00	615.00
	97	671.00	625.00
	98	678.00	629.00
	99	687.00	637.00
English (in)			
	1	20.43	19.25
	2	20.87	20.04
	3	21.02	20.16
	5	21.46	20.35
	10	22.01	20.75
	20	22.48	21.18
	25	22.72	21.38
	50	23.70	22.17
	75	24.69	23.11
	80	24.92	23.35
	90	25.55	23.82
	95	25.94	24.21
	97	26.42	24.61
	98	26.69	24.76
	99	27.05	25.08

85. CAESAR Name: ACROMIAL HEIGHT, SITTING (COMFORTABLE), RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	643.00	643.00	693.00	693.00
Weighted Size	642.40	642.40	691.38	691.38
Mean	593.92	23.38	560.88	22.08
SE Mean	1.34	0.05	1.12	0.04
STD	34.10	1.34	29.58	1.16
Minimum	491.00	19.33	469.00	18.46
Maximum	688.00	27.09	679.00	26.73



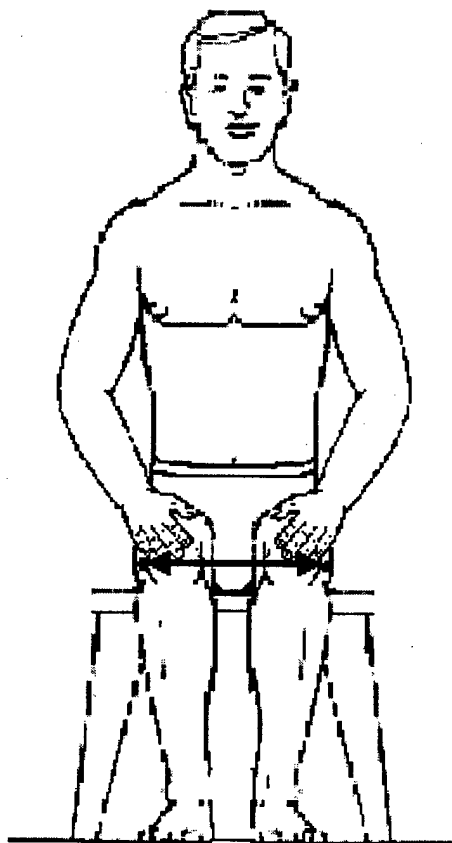
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	509.00	491.00
	2	523.00	500.00
	3	529.00	503.00
	5	539.00	512.00
	10	549.00	523.00
	20	565.00	535.00
	25	571.00	541.00
	50	595.00	561.00
	75	617.00	581.00
	80	623.00	586.00
	90	637.00	599.00
	95	651.00	607.00
	97	659.00	617.00
	98	663.00	621.00
	99	673.00	629.00
English (in)			
	1	20.04	19.33
	2	20.59	19.69
	3	20.83	19.80
	5	21.22	20.16
	10	21.61	20.59
	20	22.24	21.06
	25	22.48	21.30
	50	23.43	22.09
	75	24.29	22.87
	80	24.53	23.07
	90	25.08	23.58
	95	25.63	23.90
	97	25.94	24.29
	98	26.10	24.45
	99	26.50	24.76

86. CAESAR Name: BI-LATERAL FEMORAL EPICONDYLE BREADTH, SITTING
(COMFORTABLE)

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	694.00	694.00
Weighted Size	644.70	644.70	692.32	692.32
Mean	451.65	17.78	347.34	13.67
SE Mean	1.79	0.07	1.92	0.08
STD	45.59	1.79	50.56	1.99
Minimum	285.08	11.22	202.58	7.98
Maximum	597.61	23.53	477.18	18.79



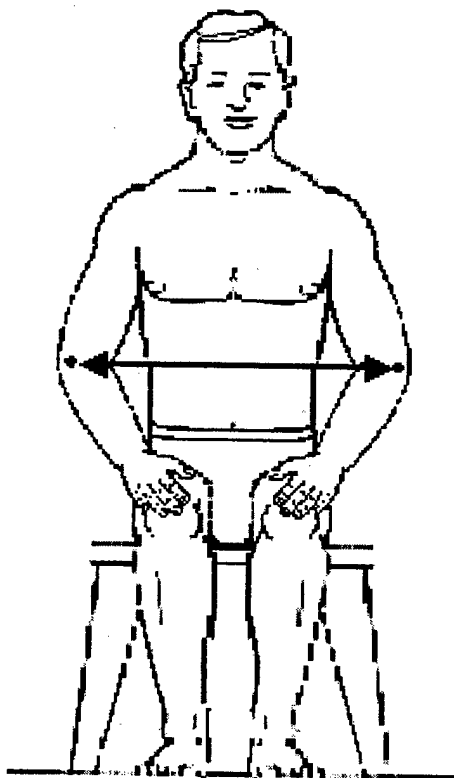
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	343.00	223.74
	2	358.54	240.47
	3	367.64	247.21
	5	381.07	259.75
	10	395.46	281.76
	20	414.21	307.75
	25	421.17	313.51
	50	450.72	349.93
	75	480.14	381.12
	80	487.86	390.59
	90	506.71	410.55
	95	530.03	429.92
	97	541.22	438.22
	98	555.92	453.42
	99	578.43	463.62
English (in)			
	1	13.50	8.81
	2	14.12	9.47
	3	14.47	9.73
	5	15.00	10.23
	10	15.57	11.09
	20	16.31	12.12
	25	16.58	12.34
	50	17.74	13.78
	75	18.90	15.00
	80	19.21	15.38
	90	19.95	16.16
	95	20.87	16.93
	97	21.31	17.25
	98	21.89	17.85
	99	22.77	18.25

87. CAESAR Name: BI-LATERAL HUMERAL EPICONDYLE BREADTH, SITTING
(COMFORTABLE)

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	695.00	695.00
Weighted Size	644.70	644.70	693.26	693.26
Mean	548.91	21.61	455.03	17.91
SE Mean	1.68	0.07	1.33	0.05
STD	42.76	1.68	34.94	1.38
Minimum	428.92	16.89	308.43	12.14
Maximum	706.61	27.82	607.07	23.90



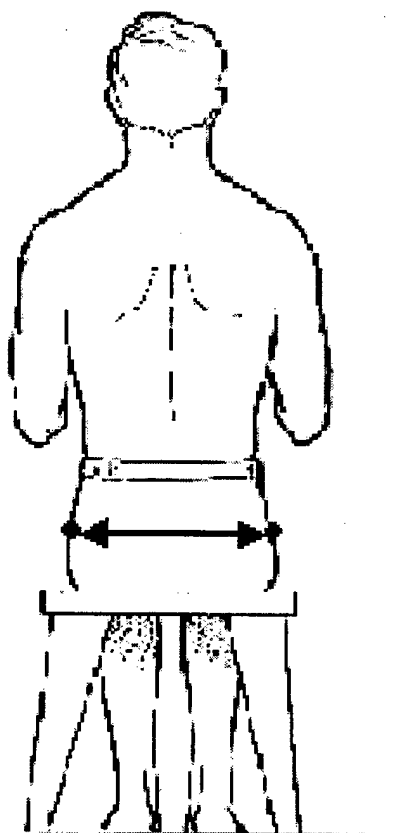
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	455.26	369.56
	2	467.49	381.52
	3	473.48	390.19
	5	481.92	402.17
	10	497.78	413.48
	20	513.96	425.94
	25	519.62	431.62
	50	546.73	455.06
	75	576.08	476.33
	80	581.32	483.71
	90	606.09	500.70
	95	622.70	513.13
	97	636.27	522.13
	98	646.29	527.04
	99	660.95	533.77
English (in)			
	1	17.92	14.55
	2	18.41	15.02
	3	18.64	15.36
	5	18.97	15.83
	10	19.60	16.28
	20	20.23	16.77
	25	20.46	16.99
	50	21.52	17.92
	75	22.68	18.75
	80	22.89	19.04
	90	23.86	19.71
	95	24.52	20.20
	97	25.05	20.56
	98	25.44	20.75
	99	26.02	21.01

88. CAESAR Name: BI-TROCHANTERIC BREADTH, SITTING (COMFORTABLE)

ISO Reference No. N/A

ISO Name:

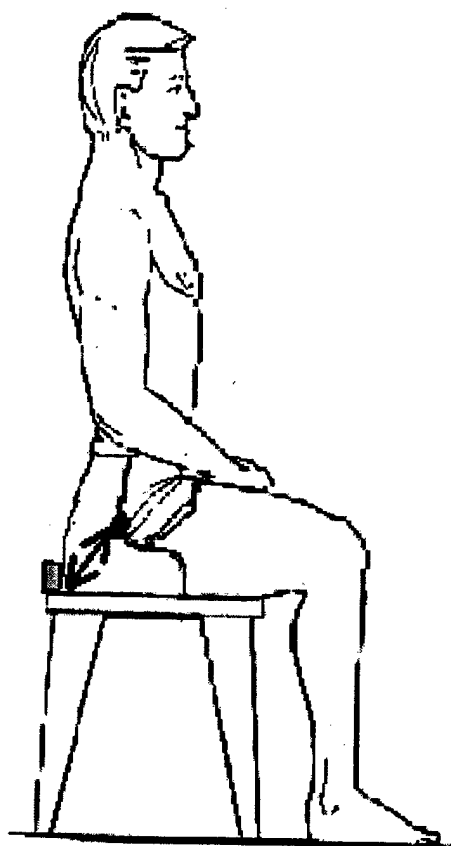
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	691.00	691.00
Weighted Size	643.62	643.62	688.78	688.78
Mean	380.01	14.96	372.80	14.68
SE Mean	0.91	0.04	0.90	0.04
STD	23.16	0.91	23.56	0.93
Minimum	304.51	11.99	313.17	12.33
Maximum	454.91	17.91	442.64	17.43



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	329.53	324.04
	2	333.34	327.67
	3	336.61	331.48
	5	343.03	336.08
	10	349.02	340.84
	20	360.16	351.56
	25	365.41	355.37
	50	379.79	373.09
	75	395.44	389.51
	80	401.97	392.20
	90	410.03	404.13
	95	417.14	412.43
	97	423.03	417.36
	98	425.60	423.76
	99	430.83	432.54
English (in)			
	1	12.97	12.76
	2	13.12	12.90
	3	13.25	13.05
	5	13.51	13.23
	10	13.74	13.42
	20	14.18	13.84
	25	14.39	13.99
	50	14.95	14.69
	75	15.57	15.33
	80	15.83	15.44
	90	16.14	15.91
	95	16.42	16.24
	97	16.65	16.43
	98	16.76	16.68
	99	16.96	17.03

89. CAESAR Name: BUTTOCK TO TROCHANTER LENGTH (COMFORTABLE)
 ISO Reference No. N/A
 ISO Name:

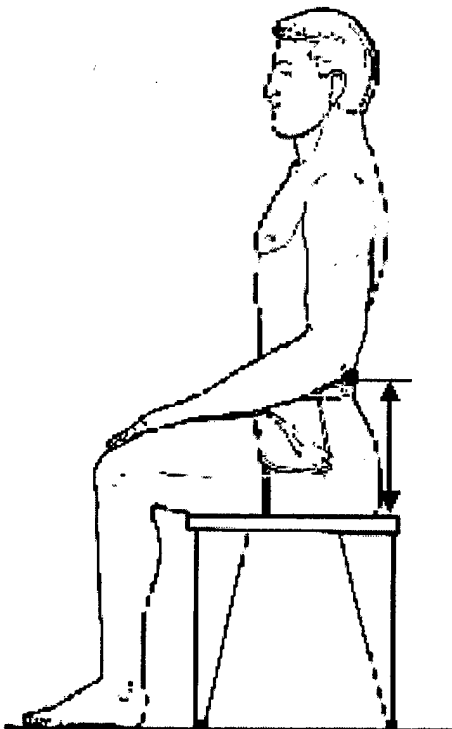
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	642.00	642.00	690.00	690.00
Weighted Size	641.32	641.32	687.84	687.84
Mean	176.39	6.94	183.45	7.22
SE Mean	0.61	0.02	0.53	0.02
STD	15.41	0.61	14.01	0.55
Minimum	132.57	5.22	139.41	5.49
Maximum	237.30	9.34	235.65	9.28



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	140.04	152.04
	2	145.18	155.87
	3	148.09	156.73
	5	152.30	160.05
	10	157.10	164.36
	20	164.08	171.15
	25	166.01	174.35
	50	175.61	183.75
	75	186.62	193.40
	80	188.84	195.55
	90	196.75	201.26
	95	203.70	205.41
	97	206.36	208.20
	98	208.68	211.10
	99	211.96	215.27
English (in)			
	1	5.51	5.99
	2	5.72	6.14
	3	5.83	6.17
	5	6.00	6.30
	10	6.18	6.47
	20	6.46	6.74
	25	6.54	6.86
	50	6.91	7.23
	75	7.35	7.61
	80	7.43	7.70
	90	7.75	7.92
	95	8.02	8.09
	97	8.12	8.20
	98	8.22	8.31
	99	8.34	8.48

90. CAESAR Name: ELBOW HEIGHT, SITTING (COMFORTABLE), LEFT
 ISO Reference No. N/A
 ISO Name:

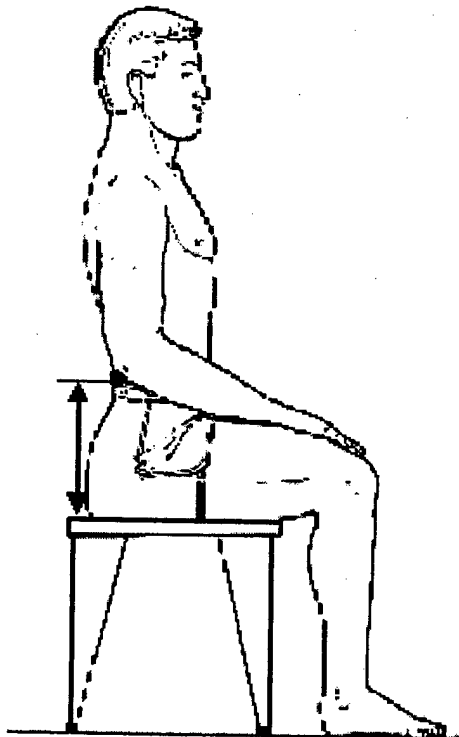
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	643.00	643.00	694.00	694.00
Weighted Size	642.40	642.40	692.32	692.32
Mean	287.06	11.30	274.88	10.82
SE Mean	1.18	0.05	1.06	0.04
STD	30.02	1.18	28.05	1.10
Minimum	195.00	7.68	171.00	6.73
Maximum	366.00	14.41	369.00	14.53



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	209.00	213.00
	2	221.00	217.00
	3	231.00	223.00
	5	237.00	227.00
	10	247.00	237.00
	20	262.00	251.00
	25	267.00	257.00
	50	287.00	277.00
	75	307.00	293.00
	80	313.00	299.00
	90	325.00	309.00
	95	337.00	317.00
	97	343.00	321.00
	98	347.00	329.00
	99	357.00	338.00
English (in)			
	1	8.23	8.39
	2	8.70	8.54
	3	9.09	8.78
	5	9.33	8.94
	10	9.72	9.33
	20	10.31	9.88
	25	10.51	10.12
	50	11.30	10.91
	75	12.09	11.54
	80	12.32	11.77
	90	12.80	12.17
	95	13.27	12.48
	97	13.50	12.64
	98	13.66	12.95
	99	14.06	13.31

91. CAESAR Name: ELBOW HEIGHT, SITTING (COMFORTABLE), RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	643.00	643.00	694.00	694.00
Weighted Size	642.40	642.40	692.32	692.32
Mean	278.30	10.96	270.67	10.66
SE Mean	1.14	0.05	1.01	0.04
STD	28.98	1.14	26.58	1.05
Minimum	183.00	7.20	178.00	7.01
Maximum	361.00	14.21	367.00	14.45



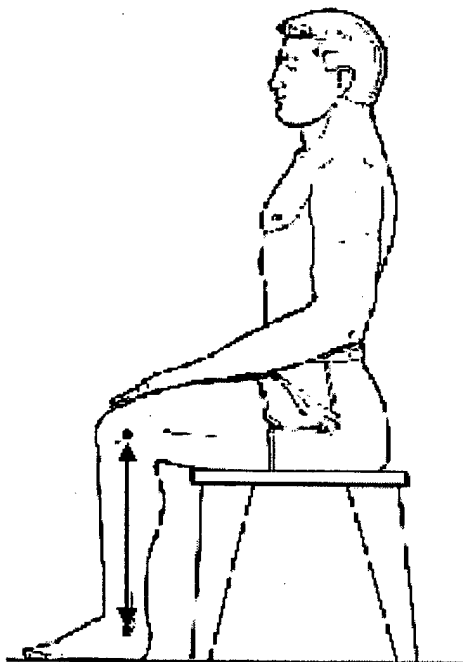
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	203.00	206.00
	2	219.00	213.00
	3	224.00	217.00
	5	231.00	225.00
	10	241.00	237.00
	20	255.00	249.00
	25	259.00	253.00
	50	279.00	273.00
	75	298.00	287.00
	80	303.00	291.00
	90	317.00	303.00
	95	328.00	314.00
	97	333.00	317.00
	98	335.00	325.00
	99	340.00	329.00
English (in)			
	1	7.99	8.11
	2	8.62	8.39
	3	8.82	8.54
	5	9.09	8.86
	10	9.49	9.33
	20	10.04	9.80
	25	10.20	9.96
	50	10.98	10.75
	75	11.73	11.30
	80	11.93	11.46
	90	12.48	11.93
	95	12.91	12.36
	97	13.11	12.48
	98	13.19	12.80
	99	13.39	12.95

92. CAESAR Name: FEMORAL EPICONDYLE, LATERAL, LEFT TO MALLEOLUS, LATERAL, (COMFORTABLE) LEFT

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	694.00	694.00
Weighted Size	644.70	644.70	692.32	692.32
Mean	413.77	16.29	372.63	14.67
SE Mean	0.97	0.04	0.82	0.03
STD	24.62	0.97	21.71	0.85
Minimum	344.39	13.56	317.61	12.50
Maximum	491.37	19.35	448.24	17.65



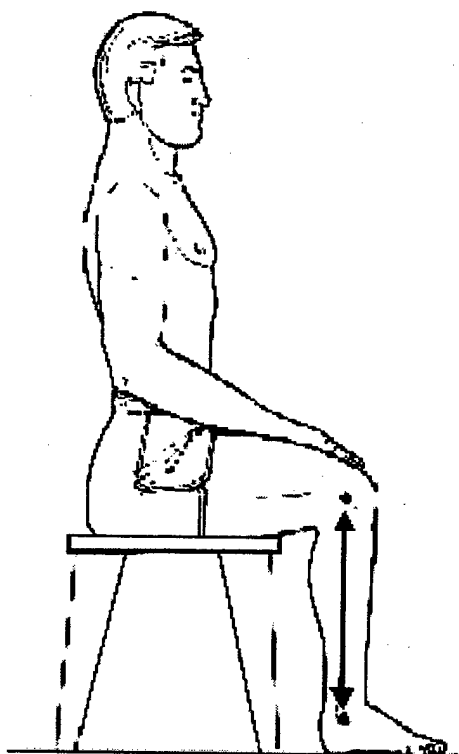
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	361.29	327.88
	2	364.98	331.42
	3	369.44	335.82
	5	374.41	338.38
	10	382.78	346.26
	20	392.89	352.98
	25	397.60	356.39
	50	411.70	371.92
	75	429.75	387.56
	80	435.15	390.67
	90	446.76	401.04
	95	455.55	408.49
	97	464.32	416.06
	98	466.71	418.29
	99	473.68	426.46
English (in)			
	1	14.22	12.91
	2	14.37	13.05
	3	14.54	13.22
	5	14.74	13.32
	10	15.07	13.63
	20	15.47	13.90
	25	15.65	14.03
	50	16.21	14.64
	75	16.92	15.26
	80	17.13	15.38
	90	17.59	15.79
	95	17.94	16.08
	97	18.28	16.38
	98	18.37	16.47
	99	18.65	16.79

93. CAESAR Name: FEMORAL EPICONDYLE, LATERAL, RIGHT TO MALLEOLUS, LATERAL (COMFORTABLE), RIGHT

ISO Reference No. N/A

ISO Name:

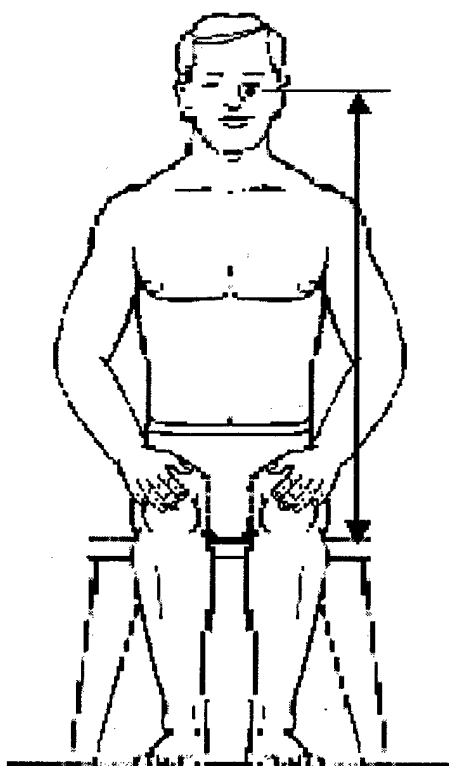
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	694.00	694.00
Weighted Size	643.62	643.62	692.32	692.32
Mean	411.78	16.21	373.00	14.69
SE Mean	0.93	0.04	0.81	0.03
STD	23.61	0.93	21.34	0.84
Minimum	344.65	13.57	320.13	12.60
Maximum	484.34	19.07	454.02	17.87



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	362.27	328.43
	2	364.30	333.06
	3	368.87	336.01
	5	373.79	339.37
	10	381.33	346.63
	20	392.67	355.57
	25	396.67	358.28
	50	410.90	371.33
	75	426.78	387.34
	80	431.61	390.43
	90	442.20	400.55
	95	452.36	410.64
	97	459.03	415.79
	98	466.39	424.65
	99	472.61	430.11
English (in)			
	1	14.26	12.93
	2	14.34	13.11
	3	14.52	13.23
	5	14.72	13.36
	10	15.01	13.65
	20	15.46	14.00
	25	15.62	14.11
	50	16.18	14.62
	75	16.80	15.25
	80	16.99	15.37
	90	17.41	15.77
	95	17.81	16.17
	97	18.07	16.37
	98	18.36	16.72
	99	18.61	16.93

94. CAESAR Name: INFRAORBITALE HEIGHT, SITTING (COMFORTABLE), LEFT
ISO Reference No. N/A
ISO Name:

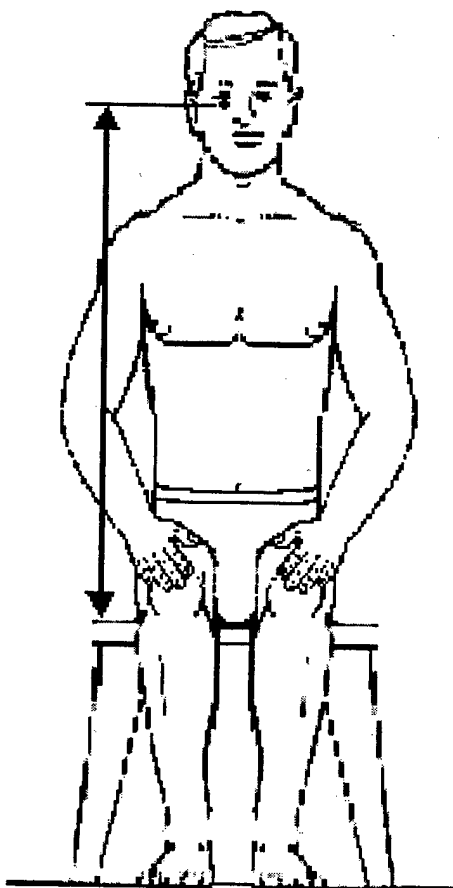
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	643.00	643.00	693.00	693.00
Weighted Size	642.40	642.40	691.50	691.50
Mean	780.97	30.75	731.52	28.80
SE Mean	1.62	0.06	1.36	0.05
STD	40.98	1.61	35.73	1.41
Minimum	661.00	26.02	621.00	24.45
Maximum	889.00	35.00	843.00	33.19



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	683.00	646.00
	2	695.00	653.00
	3	701.00	661.00
	5	713.00	671.00
	10	727.00	687.00
	20	747.00	703.00
	25	753.00	709.00
	50	781.00	733.00
	75	809.00	755.00
	80	817.00	763.00
	90	835.00	777.00
	95	847.00	789.00
	97	858.00	796.00
	98	861.00	805.00
	99	873.00	815.00
English (in)			
	1	26.89	25.43
	2	27.36	25.71
	3	27.60	26.02
	5	28.07	26.42
	10	28.62	27.05
	20	29.41	27.68
	25	29.65	27.91
	50	30.75	28.86
	75	31.85	29.72
	80	32.17	30.04
	90	32.87	30.59
	95	33.35	31.06
	97	33.78	31.34
	98	33.90	31.69
	99	34.37	32.09

95. CAESAR Name: INFRAORBITALE HEIGHT, SITTING (COMFORTABLE), RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	643.00	643.00	694.00	694.00
Weighted Size	642.40	642.40	692.32	692.32
Mean	780.84	30.74	731.16	28.79
SE Mean	1.61	0.06	1.36	0.05
STD	40.85	1.61	35.74	1.41
Minimum	657.00	25.87	623.00	24.53
Maximum	893.00	35.16	844.00	33.23



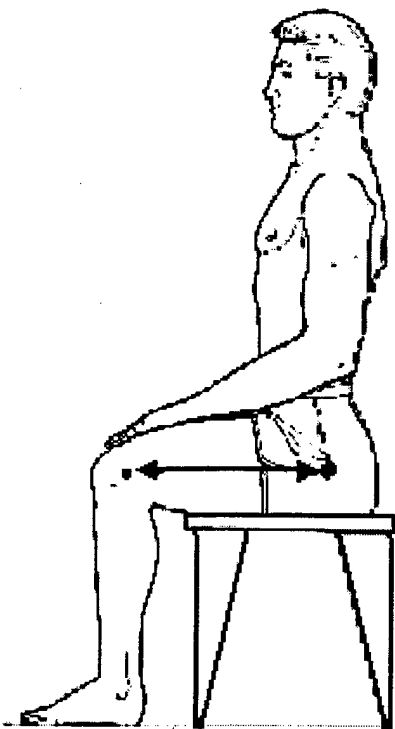
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	685.00	641.00
	2	697.00	655.00
	3	704.00	659.00
	5	711.00	671.00
	10	727.00	686.00
	20	747.00	702.00
	25	753.00	709.00
	50	781.00	732.00
	75	809.00	756.00
	80	817.00	761.00
	90	835.00	777.00
	95	845.00	789.00
	97	855.00	795.00
	98	861.00	807.00
	99	871.00	812.00
English (in)			
	1	26.97	25.24
	2	27.44	25.79
	3	27.72	25.94
	5	27.99	26.42
	10	28.62	27.01
	20	29.41	27.64
	25	29.65	27.91
	50	30.75	28.82
	75	31.85	29.76
	80	32.17	29.96
	90	32.87	30.59
	95	33.27	31.06
	97	33.66	31.30
	98	33.90	31.77
	99	34.29	31.97

96. CAESAR Name: TROCHANTER TO FEMORAL EPICONDYLE, LATERAL
(COMFORTABLE), LEFT

ISO Reference No. N/A

ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	646.00	646.00	691.00	691.00
Weighted Size	644.70	644.70	688.78	688.78
Mean	441.44	17.38	415.07	16.34
SE Mean	1.07	0.04	1.04	0.04
STD	27.09	1.07	27.35	1.08
Minimum	361.15	14.22	340.15	13.39
Maximum	530.84	20.90	491.00	19.33



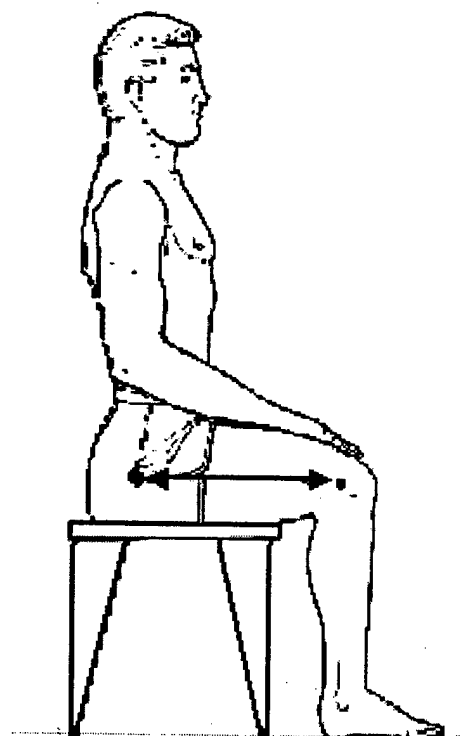
	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	376.06	356.13
	2	388.15	360.67
	3	391.00	365.09
	5	400.16	372.50
	10	408.12	381.06
	20	417.86	391.67
	25	423.21	396.32
	50	441.54	413.55
	75	459.84	433.45
	80	463.94	438.35
	90	476.15	452.15
	95	486.69	461.66
	97	492.46	470.70
	98	501.08	474.37
	99	504.65	482.18
English (in)			
	1	14.81	14.02
	2	15.28	14.20
	3	15.39	14.37
	5	15.75	14.67
	10	16.07	15.00
	20	16.45	15.42
	25	16.66	15.60
	50	17.38	16.28
	75	18.10	17.07
	80	18.27	17.26
	90	18.75	17.80
	95	19.16	18.18
	97	19.39	18.53
	98	19.73	18.68
	99	19.87	18.98

97. CAESAR Name: TROCHANTER TO FEMORAL EPICONDYLE, LATERAL
(COMFORTABLE), RIGHT

ISO Reference No. N/A

ISO Name:

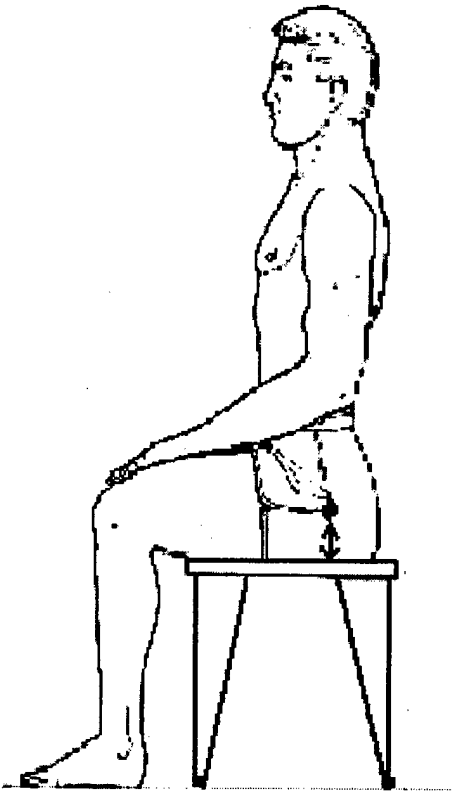
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	645.00	645.00	690.00	690.00
Weighted Size	643.62	643.62	687.84	687.84
Mean	440.20	17.33	415.77	16.37
SE Mean	1.07	0.04	1.04	0.04
STD	27.25	1.07	27.39	1.08
Minimum	348.75	13.73	339.51	13.37
Maximum	532.61	20.97	512.00	20.16



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	374.07	357.25
	2	384.57	363.01
	3	390.54	367.65
	5	396.95	372.59
	10	407.49	379.66
	20	417.10	391.89
	25	421.25	396.37
	50	439.19	415.31
	75	457.99	435.12
	80	462.72	439.53
	90	474.04	451.09
	95	485.79	461.33
	97	495.07	469.21
	98	499.92	473.72
	99	503.95	477.70
English (in)			
	1	14.73	14.06
	2	15.14	14.29
	3	15.38	14.47
	5	15.63	14.67
	10	16.04	14.95
	20	16.42	15.43
	25	16.58	15.61
	50	17.29	16.35
	75	18.03	17.13
	80	18.22	17.30
	90	18.66	17.76
	95	19.13	18.16
	97	19.49	18.47
	98	19.68	18.65
	99	19.84	18.81

98. CAESAR Name: TROCHANTER TO SEATED SURFACE (COMFORTABLE), LEFT
 ISO Reference No. N/A
 ISO Name:

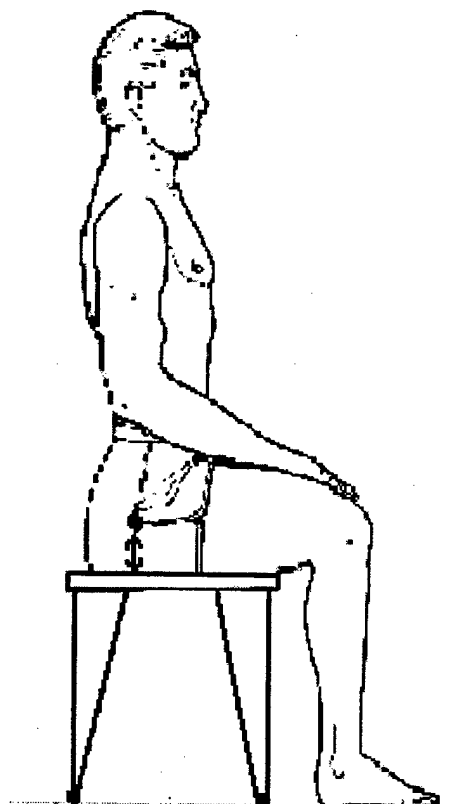
	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	643.00	643.00	691.00	691.00
Weighted Size	642.40	642.40	688.78	688.78
Mean	134.05	5.28	133.17	5.24
SE Mean	0.54	0.02	0.51	0.02
STD	13.79	0.54	13.38	0.53
Minimum	89.00	3.50	79.00	3.11
Maximum	179.00	7.05	191.00	7.52



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	103.00	101.00
	2	107.00	106.50
	3	109.00	109.00
	5	113.00	114.00
	10	117.00	119.00
	20	123.00	123.00
	25	125.00	125.00
	50	134.00	132.00
	75	143.00	141.00
	80	145.00	143.00
	90	151.00	151.00
	95	157.00	155.00
	97	161.00	159.00
	98	167.00	163.00
	99	173.00	171.00
English (in)			
	1	4.06	3.98
	2	4.21	4.19
	3	4.29	4.29
	5	4.45	4.49
	10	4.61	4.69
	20	4.84	4.84
	25	4.92	4.92
	50	5.28	5.20
	75	5.63	5.55
	80	5.71	5.63
	90	5.94	5.94
	95	6.18	6.10
	97	6.34	6.26
	98	6.57	6.42
	99	6.81	6.73

99. CAESAR Name: TROCHANTER TO SEATED SURFACE (COMFORTABLE), RIGHT
 ISO Reference No. N/A
 ISO Name:

	MEN		WOMEN	
	Metric (mm)	English (in)	Metric (mm)	English (in)
Sample Size	642.00	642.00	690.00	690.00
Weighted Size	641.32	641.32	687.84	687.84
Mean	137.09	5.40	135.36	5.33
SE Mean	0.54	0.02	0.51	0.02
STD	13.76	0.54	13.32	0.52
Minimum	89.00	3.50	91.00	3.58
Maximum	197.00	7.76	179.00	7.05



	Percentiles	MEN	WOMEN
		Quantile	Quantile
Metric (mm)			
	1	105.00	107.00
	2	109.00	111.00
	3	113.00	111.00
	5	115.00	115.00
	10	121.00	119.00
	20	127.00	125.00
	25	127.00	127.00
	50	137.00	135.00
	75	145.00	143.00
	80	147.00	146.00
	90	153.00	153.00
	95	159.00	159.00
	97	165.00	161.00
	98	167.00	165.00
	99	175.00	168.00
English (in)			
	1	4.13	4.21
	2	4.29	4.37
	3	4.45	4.37
	5	4.53	4.53
	10	4.76	4.69
	20	5.00	4.92
	25	5.00	5.00
	50	5.39	5.31
	75	5.71	5.63
	80	5.79	5.75
	90	6.02	6.02
	95	6.26	6.26
	97	6.50	6.34
	98	6.57	6.50
	99	6.89	6.61

APPENDIX: RESOURCE LISTING – CARD LAB FIT-MAPPING STUDIES

1. Accommodation and Occupational Safety for Pregnant Military Personnel (Pregnant Women's Study (PWS)) – The purpose of this study was to collect a set of traditional anthropometric data and three-dimensional (3-D) whole-body scan data set for a sample population of pregnant women. The study objectives were: to characterize size and shape changes for a sample population of pregnant women, and to provide recommendations for future research to evaluate the occupational constraints placed on pregnant women due to their changing body size and physical capabilities.

Results: Many of the changes in body dimensions were calculated as percentage changes from one session to the baseline session. For most traditional measurements, there was an increase from Session 1 to Session 5, then a sharp decrease from Session 5 to Session 6, as expected. The most obvious changes are in weight, the waist region, and in abdominal protrusion. One unexpected change occurred in the traditional dimension, Tenth Rib Height. On average, there was a significant increase in Tenth Rib Height over the course of pregnancy from Session 1 to Session 5. The ribs flared outward and upward to make room for the growing fetus. As a result, the Tenth Rib Height increased. 25 pregnant women had their bodies scanned throughout their pregnancy.

Sample Size: The sample size was 25 females. Sixteen were civilians and nine were military members. Eighteen subjects were employed (9 military and 9 civilians), and 7 (civilians) were unemployed. Eight of the military members were in the Air Force and the other was in the Navy.

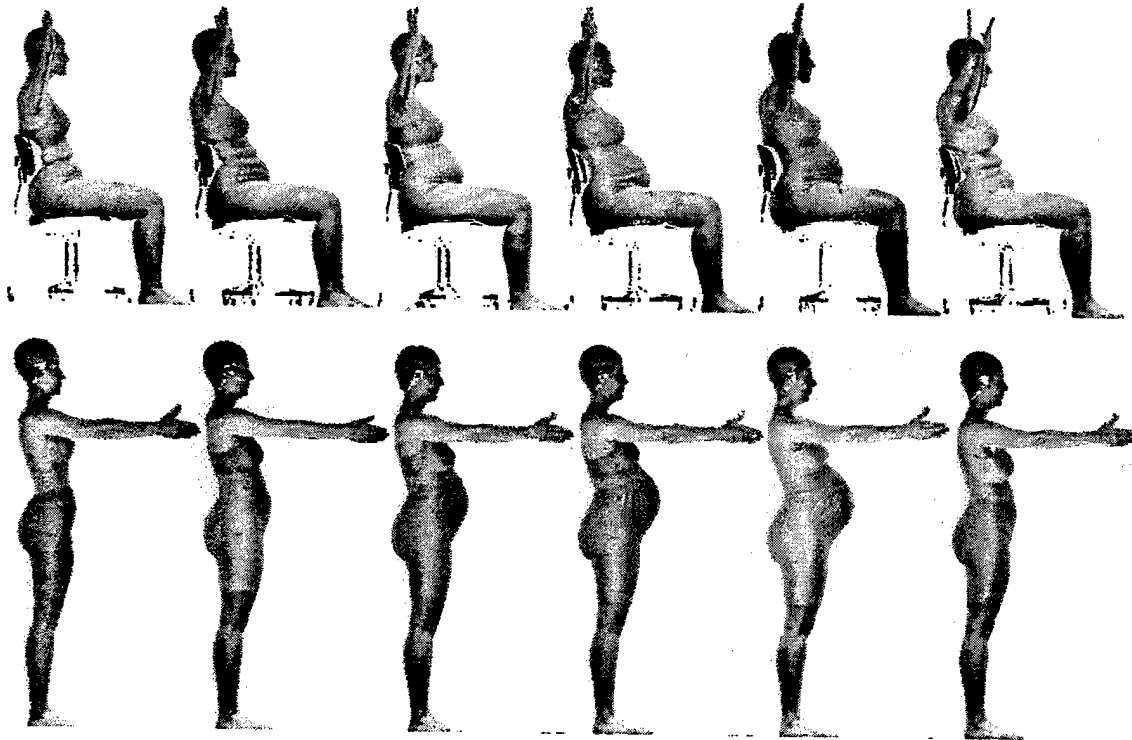
Demographic Questions: Standard Demographic Questions (*), as well as what Type of Job they had: Desk or Non-Desk; Standing or Sitting; Typing; and if they encounter any Reach Problems performing their job duties.

Measurements Taken: Thumb Tip Reach Rt., Weight, Stature, Cervicale Height, Suprasternale Height, Chest Height, Chest Height Below Bust, Tenth Rib Height, Waist Height Preferred, Waist Height Omphalion, Patella Top Height, Chest Breadth, Chest Breadth Below Bust, Waist Breadth Preferred, Waist Breadth Omphalion, Hip Breadth, Chest Depth, Chest Depth Below Bust, Waist Depth Preferred, Waist Depth Omphalion, Chest Circumference, Chest Circumference Below Bust, Waist Circumference Preferred, Waist Circumference Omphalion, Hip Circumference, Thigh Circumference, Calf Circumference, Ankle Circumference, Foot Breadth, Sitting Height, Cervicale Height Sitting, Buttock-Knee Length, Abdominal Ext. Depth Sitting, Hip Breadth Sitting, Hand Breadth

Scanning Landmarks: Standing: Axilla(2), Bustpoint(2), Substernale, Tenth Rib(2), Waist Level Preferred(4), Waist Level Omphalion(4), PSIS(2), ASIS(2), Illiocristale(2), Buttock Point(3), Suprapatella(2), Malleolus Lateral(2), Malleolus Medial(2), Metatarsal I(2), Metatarsal V(2)

Scanning Landmarks: Sitting: Tragion(2), Infraorbitale(2), Suprasternale, Cervicale, Spine(3), Acromion(2), Humeral Epicondyles(4), Radial Stylium(2), Ulnar Stylium(2), Metacarpale II(2), Metacarpale V(2), Femoral Epicondyles(4)

Scanning Postures:



Data Status: There are traditional measurements available for twenty-four subjects in Excel format. Also available are 205 three-dimensional scans of these twenty-four subjects in .iv format. These scans can be made accessible to most CAD programs for further measurement extractions if needed.

Acknowledgements: The research activities of the Accommodation and Occupational Safety for Pregnant Military Personnel project were conducted by Sytronics, Inc. through U.S. Army Medical Research and Materiel Command Grant DAMD17-96-1-6311. Government resources (traditional anthropometric tools and whole-body scanner) were used extensively in performing the required research. These resources are the property of the Computerized Anthropometric Research and Design (CARD) Laboratory of the Crew System Interface Division, Human Effectiveness Directorate, Air Force Research Laboratory (AFRL) at Wright-Patterson Air Force Base, Ohio. Access to these resources was gained through United States Air Force (USAF) Cooperative Research and Development Agreement (CRDA) 97-066-AL-01. Ms. Sacelia Heller (MCMR-AAA-A) was the government point of contact for the research grant and Ms. Kathleen Robinette (AFRL/HECP) for the CRDA.

2. An Evaluation of Pilot Uplook For A U.S. Air Force and U.S. Navy Helmet-Mounted cueing System (Uplook Angle Study) – The Uplook Angle study was undertaken in order to determine human limitations in head and neck range of motion in the vertical plane, while seated in a variety of ejection seats, and while wearing different ensembles of protective equipment. The primary goal of the Uplook Angle study was to measure dorsal flexion capability (in a vertical plane) of the current aircrew population in order to establish a physiological baseline.

The Uplook Angle Study was approached in two phases. First, the single and double-circle air-to-air engagements were deemed to be the most radical or difficult cueing tasks, a simple X-Z plane (vertical) measure of dorsal neck flexion was undertaken. This phase, Phase I, is described in the main body of the report. The second phase of the study, Phase II, was to establish the full three-dimensional head motion envelope the pilot was able to obtain. Phase II (Motion Envelope) testing uses a motion-sensor tracking system to determine the regions within which a pilot can point his or her helmet. A description of Phase II appears in the Appendix B of the report.

Data from the study will serve as input into a joint service system which will enhance aircraft lethality and survivability by reducing the amount of time aircrews need to acquire targets. The objective is to have the JHMCS integrated into existing aircraft (F-15, F/A-18, F-16, F-22, F-14, and AV-8B) with varying parameters defining a reference location for the pilot.

Results: Overall, the smallest envelope measured was the estimated Hi-G in the F-15 seat, wearing the HGU-55P helmet and the life preserver. Any helmet-mounted rearward sighting devices, then, should be designed to accommodate this condition. In addition, one should note that in all cases, the ability to look rearward decreases rapidly outside a range of ± 60 degrees azimuth relative to straight forward.

Sample Size: The final sample included 44 men (23 of whom were rated pilots) and 30 women. The 30 female subjects participated in the Phase I testing only. Of the 44 males, 22 participated in Phase I, including one pilot from the 422 Squadron 57 TG, Nellis Air Force Base, Nevada. The remaining 22 male subjects were pilots who participated in both the Phase I and the Phase II portions of the testing. These pilots were from the 57 TG at Nellis.

Demographic Questions: Standard Demographic Questions (*), as well as HGU-55/P Size, HGU-86/P Size, Mask used: MBU-5/P, MBU-12/P, Mask Size, Aircrew personnel, Non-rated or rated Aircrew personnel, Aircraft Type, Familiarity with NVS, High-G Experience

Measurements Taken: Weight, Stature, Sitting Height, Eye Height Sitting, Neck Base Circumference, Head Circumference, Head Length, Head Breadth, Bitragion Breadth, Bizygomatic (Face) Breadth, Menton-Sellion Length, Neck Length Anterior, Neck

Length Posterior –Inion, Neck Length Posterior –Nuchale, I.P.D. (total), I.P.D. Right, I.P.D. Left

Data Status: The data is contained on floppy disc as .dat and .lab file formats. Data is encrypted and needs to be deciphered.

Acknowledgements: This study was conducted in support of the Air Force/Navy Joint Helmet-Mounted Cueing System (JHMCS) program, which is directed by Aeronautical Systems Center's JHMCS Integrated Product Team (ASC/LYC). The authors wish to acknowledge the following contributors and thank them for their help: Jerry Woods (URDI), for collecting the data at Nellis AFB and editing the data upon his return; Greg Zehner (AL/CFHD), for helping set up the analysis, and providing consultation on the interpretation of the analysis; Dr. Joe W. McDaniel (AL/CFHD), for assistance in designing the experiment and reviewing and editing this report; Patrick Files (Sytronics, Inc.), for helping to edit this report.

3. An Investigation of the Usefulness of 3-D Digitized Facial Images for the Issuance of the MCU-2/P Protective Mask – The primary objective of this effort was to explore the usefulness of measurements extracted from digitized images in producing an issuance method which will afford each user the greatest protection in the MCU-2/P. The primary co-objectives were:
- to quantify the expected greatest protection and establish that value as the nominal fit factor of a correctly issued mask,
 - to explore the mean changes in fit factor if one or more mask sizes are eliminated,
 - to identify testing pitfalls and use that information to determine how to design a verification test of a new issuance method, and
 - to identify users who are unable to get an acceptable fit in any size of the MCU-2/P.

The secondary objective of this effort was to characterize where the seal of a best fit mask sits on the face, and how that location changes during facial movement.

Results: It is not necessarily surprising that issuing and tariffing methods can be fine tuned by incorporating more dimensions. For the subsample, the bestfit method required taking several measurements relating to 6 landmarks (menton, gonion, trigion, zygion, glabella and the center of the lips), in order to provide a 29% increase $[(310,000 - 240,000)/240,000]$ in nominal fit factor over the current caliper method, which required taking one measurement between two landmarks (menton and sellion). Clearly, the bestfit method would require non-contact measurement, image processing and data processing to be feasible for issuance and tariffing. The question of whether or not the benefits of the bestfit method are worth the added complexity and implied design changes can only be answered by those cognizant of both the perceived threat environments and the bestfit method benefits.

Sample Size: A total of 115 subjects were tested. Of these, the first three had outlying fit factor scores which seemed to be due to external environment conditions; consequently, they were eliminated from further study. The remaining sample of 112 was used in the

preliminary dependent variable (fit factor scores) analyses. Of the 112 subjects, 37 were selected for inclusion in the preliminary independent variable (facial dimensions) analyses and the final analyses. The subsample selection method is outlined below:

- Does the subject have a complete and ostensibly accurate facial dimension data set? 47 subjects were eliminated for this reason.
- Of the remaining subjects, does the subject's fit factor score clearly place him or her in a unique best fit size? 28 subjects were eliminated for this reason, leaving the selected subsample of 37.

Demographic Questions: Age, Sex, Reported Height, and Reported Weight

Measurements Taken: Tragon-Top of Head Length, Head Circumference, Coronal Arc, Minimum Frontal Arc, Subnasale Arc, Submandibular Arc, Head Length, Head Breadth, Bizygomatic Breadth, Bigonial Breadth, Menton-Sellion Length, Nose Breadth

Scanning Landmarks: Tragon(2), Zygion(2), Gonion(2), Zygofrontale(2), Infraorbitale(2), Glabella, Sellion, Pronasale, Menton, Maskpoints 1 to 20

Scan Data (Derived): Polygonal Perimeter, Delta, Menton-Sellion Length (MNSELL), Menton Glabella Length (MNGLAB), Sellion-Gonion Length (SELGON), Left Zygion-Right Gonion length (XZYGON), Left Zygion- Left Gonion Length (ZYGON), Menton Maskpoint 1 Length (MNPT1), Menton Maskpoint 11 Length (MNPT11), Menton Maskpoint 6 Length (MNPT6), Bizygomatic Breadth (ZYGZYG), Bigonial Breadth (BZG+BZG), Maskoint 6 to 16 Breadth (6+16), Maskpoint 1 to 11 Length (PIP11), MNPT1 – MNGLAB (GLBPT1)

Data Status: 115 landmark files representing both the subject and the subject's mask are available.

Acknowledgements: The research described in this report was conducted as a Phase 1 SBIR (contract number F33615-88-C-0552), issued by the Air Force Systems Command, Aeronautical Systems Division to Arkline Research, Cherry Hill, NJ. The period of performance was April 1989 to April 1990. Data for the effort was obtained and preprocessed at Wright-Patterson Air Force Base, Dayton, OH in cooperation with the effort's sponsor, the Human Engineering Group of the Armstrong Aerospace Medical Research Laboratory.

4. A Statistical Analysis of the Sizing System for the Advanced Technology Anti-G Suit (ATAGS) – The Advanced Technology Anti-G Suit (ATAGS) is an extended-cover anti-G garment designed to replace the standard U.S. Air Force G-Suit, the CSU-13B/P. A fit test of the ATAGS was conducted by investigators from the Human Engineering and the Crew Technology divisions at Armstrong Laboratory. The objectives were to assess the anthropometric sizing issues as they pertain to the Air Force male and female aircrew population currently flying, or expecting assignment to, fighter aircraft.

Results indicate that the current anti-G suit sizing system is adequate for the male target population. It covers approximately 98.5% of that population, as is. However, some recommendations can be made to improve the fit of the patterns. Furthermore, it appears that three sizes could be eliminated with an expected population coverage drop to 94%. Waist Circumference (at Iliocristale) and Crotch Height were identified as the key anthropometric dimensions for distinguishing suit size. A new size selection chart and procurement tariff was developed.

Results: A complete set of six female-proportioned sizes are recommended in the event that pilot training entrance requirements are changed to permit entry of more females. Four of these sizes are needed to accommodate the current female pilot population. It is also recommended that more lacing cord be added to the adjustment laces in the waist area of the women's sizes to allow a better fit in the waist-to-hip region. The recommended women's sizes should be prototyped and fit tested in order to determine whether the sizing system described in this report is adequate.

Sample Size: Results indicate that the current anti-G suit sizing system is adequate for the male population, therefore females were the target for this study. Five active-duty female pilots, who had experience with anti-G suits, were tested in the ATAGS. With only five subjects, the analytical approach was to determine expected relevant gender-proportional differences, make inferences about the ATAGS females based on other studies, and make recommendations regarding an ATAGS sizing system that will accommodate women.

Demographic Questions: Standard Demographic Questions (*), as well as reported height and reported weight.

Measurements Taken: Weight, Stature, Rt. 10th Rib Height, Rt. Iliocristale Height, Buttock Height, Lt. 10th Rib Height, Lt. Iliocristale Height, Waist Height Preferred, Waist Height Omphalion, Crotch Height, 10th Rib Circumference, Waist Circumference Preferred, Waist Circumference Omphalion, Waist Circumference at Iliocristale, Mid-Knee Height, Calf Height, Buttock Circumference, Maximum Buttock Circumference, Thigh Circumference, Knee Circumference, Calf Circumference, Foot Circumference, Foot Length, Foot Breadth, Hip Breadth Sitting

Data Status: Anthropometric measurements and statistical evaluations for 269 subjects, including the targeted six female subjects, are available.

Acknowledgements: This study was conducted under contracts F33615-89-C-0572 and F41624-93-C-6001 with Armstrong Laboratory, Wright-Patterson Air Force Base, Ohio. The authors wish to thank Master Sergeant Durrell Bess and Staff Sergeant Kent Lewis of the Crew Technology Division at Brooks Air Force Base, and Ms. Sherri Blackwell and Mr. Henry Case of Anthropology Research Project, Inc. for their expertise in anthropometry and their outstanding efforts in planning and conducting data collection. The authors also wish to thank Mrs. Stacie Taylor and Mr. Patrick Files of Sytronics, Inc. for preparing numerous graphics and providing editorial support.

5. Body Size Accommodation in USAF Aircraft (Cockpit Accommodation Study) – The USAF is considering relaxing body size entrance requirements for Undergraduate Pilot Training (AFI 48-123) to provide equal opportunity for both genders. The research described here was undertaken from 1997 through 2000 to determine the smallest and largest people that can safely and efficiently operate each current USAF aircraft. In the past, aircraft were measured during the procurement process, to ensure they met the specifications set by the USAF, but not to determine the absolute limits of body size accommodation. Body size limit data for each aircraft will help policy makers determine if a change to AFI 48-123 is the best interest of the USAF by indicating:

- 1) If pilots of extreme size are safely accommodated in specific cockpits
- 2) If there are adequate career paths available for pilots of extreme body size within the current and future USAF aircraft inventory, and
- 3) If there are cost effective modifications that could increase accommodation levels.

Our approach in the anthropometric portion of this research is to use numerous test subjects representing the extremes of body sizes within the potential user population to create a list of Anthropometric Operational Requirements for each cockpit for 21 aircrafts.

Results: Aircraft Functional Anthropometric Requirements are broken down by each of the 21 aircrafts in the Appendix of the report.

Sample Size: This research was carried out using live subject trials N=~25 in each aircraft, and then used multiple regression to provide the best estimate for a particular accommodation parameter.

Demographic Questions: None

Measurements Taken Inside Cockpit:

- 1) Overhead Clearance
- 2) Rudder Pedal Operation
- 3) Internal and External Visual Field
- 4) Static Ejection Clearances of the Knee, Leg, and Torso with Cockpit Structures
- 5) Operational Leg Clearances with the Main Instrument Panel
- 6) Operational Leg Clearance with the Control Stick Motion Envelope (the pilot's ability to move the stick through its full range of travel)
- 7) Hand Reach to Controls

Data Status: Consent needed to view data. Data is available in Excel format.

Acknowledgements: This research project was a group effort. A number of people participated in various stages of its' completion. Dr. Ken Kennedy, who has been our friend and mentor at AFRL, helped develop the aircraft measurement methods, assisted in gathering data, and wrote many of the reports that formed the foundation of this publication. The measuring team of Beth Rogers, David Dixon, Becky Brown, and Patrick Files spent many months away from their families and were an outstanding group

to work with. Patrick also did the initial editing of the manuscript. Jenny Andrews and LaDonna Davis were our AETC/SAS partners in this effort. In addition to gathering data they arranged aircraft and pilot access. Bob Billings of ASC/EN helped secure the funding for the program and supported us a great deal over the years. Finally, over 150 people participated as test subjects during the three years duration of this project. To each of these people we offer our thanks.

6. Dexterity Testing of Chemical Defense Gloves – The goal of this study was to determine the relative effects of four different types of chemical defense (CD) gloves on hand dexterity. While a number of tests for evaluating gloves have been developed and conducted over the past 25 years, they have varied considerably in purpose, format, and method of administration. No one appears to have developed or documented a standard set of tests or procedures designed to test dexterity. For this reason, considerable attention was devoted to the tests themselves. The battery developed here was used to compare scores of subjects without gloves and while wearing each of the following glove types:

- 12.5 mil Epichlorohydrin/Butyl (EB 12.5)
- 14 mil Epichlorohydrin/Butyl (EB 14)
- 14 mil Butyl (B 14)
- 7 mil Butyl with Nomex overglove (B 7/Nomex)

Results: Results indicate that subjects tended to perform best without gloves (as expected) and better with either of the two EB gloves than with the other gloves. Analysis of the test results also suggested that not only glove types but glove fit significantly affected performance.

Sample Size: The 30 subjects (15 males and 15 females) were paid volunteers from an established subject pool. The majority of the subjects were undergraduate students from Wright State University, many of them in the ROTC. Three females had participated in prior dexterity studies and well as three males.

Demographic Questions: Standard Demographic Questions (*), as well as Right or Left Handed, Glove Size, Liner Size, Nomex Size, and any Prior Dexterity Testing

Measurements Taken: Hand Breadth, Hand Breadth w/ Thumb, Hand Depth, Crotch Height, Digit 1 Length, Digit 2 Length, Hand Length, Digit 4 Length, Digit 5 Length, Digit 1 Circumference, Digit 2 Circumference Base, Digit 2 Circumference Tip, Digit 3 Circumference Base, Digit 3 Circumference Tip, Digit 4 Circumference Base, Digit 4 Circumference Tip, Digit 5 Circumference Base, Digit 5 Circumference Tip, Hand Circumference, Hand Circumference w/ Thumb

Data Status: Raw data are no longer available

Acknowledgements: This study was conducted by the Anthropology Research Project, Inc. under Air Force Contract F33615-82-C-0510 (Project 718408) with the U.S. Air Force Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

The authors would like to thank Captain Jerry Brown, Aerospace Medical Division, Brooks Air Force Base, for his support of the project and for providing the gloves worn by the subjects during testing. They also wish to acknowledge Ms. Donna Bagdonovich for supplying the glove liners and for her helpful suggestions. Ms. Ilse Tebbetts and Ms. Jane Reese, Anthropology Research Project, edited and prepared the manuscript for publication.

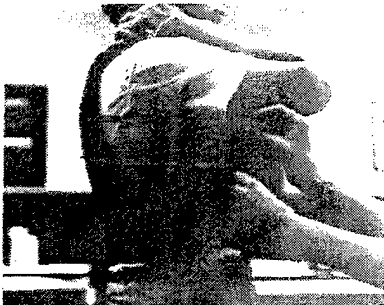
7. Fit Evaluation of Female Body Armor – An increasing number of women are joining the ranks of the Air Force security police, but because of their shape, there is some concern that females are less well protected than are men by the currently-issued military body armor, the MS-1 (Natick) vest. On some individuals, this vest leaves a large oval-shaped area exposed around the shoulder and chest, and a gap between the breastbone and the vest. The purpose of this research effort was to evaluate the fit of the MS-1 vest and several other commercial armor vests, and to suggest possible design and/or sizing modifications for currently available female body armor.

Results: Several areas of this evaluation required decisions based on trade-offs between fit, coverage, and comfort. Some of the fit problems of the MS-1 can be directly related to its Velcro strap system. In addition to the need for an improved fastening system, shorter sizes are needed. It is possible that the addition of two shorter sizes and improved Velcro fastenings may markedly improve the overall fit and coverage of this vest. A four-size system (Medium Regular, Medium Short, Large Regular, and Large Short) may suffice to solve some of the problems without major redesign of the vest.

Sample Size: Thirty-seven female Air Force security police trainees participated.

Demographic Questions: Age, Date, Vest Size, Bra Size, Reported Height, Reported Weight, Body Armor Fit questions, Body Armor Usage questions.

Measurements Taken: Weight, Height, Suprasternale, Waist Height, Cervicale Height, Chest Circumference, Interscye Front, Waist Front, Interscye Back, Waist Back, Chest Depth (midsagittal), Chest Depth (Bustpoint), Suprasternale Height Sitting, Cervicale Height Sitting



Data Status: Raw data are no longer available

Acknowledgements: This study was conducted by the Anthropology Research Project, Inc. under Air Force Contract F33615-85-C-0531 (Task 718408) with the Harry G. Armstrong Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio. Kathleen M. Robinette was the contract monitor. The authors would like to thank members of 5280th TCHTG, especially Col Doran, Major Barlow, and SMSGT Eull, Lackland Air Force Base, San Antonio, Texas, for providing test subjects and for making arrangements for the fit testing; and to the 2750th SP/SPO, Wright-Patterson Air Force Base for providing subjects and much needed feedback for the preliminary testing. We would also like to acknowledge Mrs. Belva Hodge for preparation of the manuscript and Mrs. Ilse O. Tebbetts for editing.

8. Flight Suit Sizes for Women – Creating female flight suit sizes by simply scaling the men's proportions down clearly does not address the proportioning problem. Data from fit tests can be used to determine exactly how to reportion the men's sizes so that women will be accommodated better. The purpose of this study is to develop a sizing system for women based on the analyses of the 1992 MEAFFS fit test and the 1995 MEAFFS female fit test. During this study the following questions were addressed: 1) Is there an overlap in sizes that can accommodate both men and women? 2) How many new sizes are needed that are exclusively proportioned for women? 3) How should these sizes be proportioned? 4) How much should they be changed? 5) What is an estimate of the pattern measurements for the female sizes?

Results: In general, it is recommended that all flight suit dimensions except chest, hip, thigh, waist, and crotch height decrease with respect to all other dimensions. The table below illustrates these changes in terms of existing sizes. Most areas change one size down in dimension.

	32SW*	32RW*	34SW	34RW	36SW	36RW	38SW	38RW	40SW	40RW
Collar	30S	30R	32S	32R	34S	34R	36S	36R	38S	<38R
Shoulder	30S	30R	32S	(34S)	<34S	34R	36S	(38R)	38S	<38R
Chest	32S	32R	(36S)	34R	36S	36R	(40S)	38R	(42S)	40R
Sleeve Circ	30S	30R	32S	32R	<34S	34R	36S	<36R	38S	38R
Sleeve Lth	30S	30R	(34S)	32R	34S	34R	<36S	(38S)	38S	38R
Waist Circ	30S	30R	32S	32R	34S	(<36S)	36S	36R	38S	<38R
Waist Ht	32S	32R	34S	34R	36S	36R	38S	38R	40S	40R
Torso Lth	30S	30R	32S	32R	34S	(36S)	36S	(38S)	38S	(<40R)
Hip Circ	32S	32R	34S	34R	36S	36R	38S	38R	40S	40R
Crotch Ht	32S	32R	34S	34R	(34S)	36R	38S	38R	40S	(38R)
Thigh Circ	32S	32R	34S	34R	36S	36R	38S	38R	40S	40R
Low Leg Circ	30S	30R	32S	32R	<34S	(36S)	36S	36R	38S	38R
Leg Lth	30S	30R	32S	32R	34S	34R	36S	36R	40S	40R

< indicates that the exact measurement has not been determined, but it will be less than the measurement for the given size

* indicates that the size specifications are estimated

** indicates that the dimensions for these areas do not change

() indicates that the proposed dimension does not follow trend or violates smooth grade

Previous study recommendations for female flight suit sizing were based on the fitter's overall rating. These recommendations included: adding an XS (Extra Short) length to the sizing system to accommodate subjects needing a shorter waist height (leg outseam) and crotch height (leg inseam), dropping the L (Long) length, and making the shoulders and waists smaller in circumference with respect to hip circumference. The review of neighboring size data, however, indicates that the XS length is unnecessary, since subjects with length problems could be accommodated with a different size. Thus, we recommend no changes to the waist height or crotch height.

Sample Size: Data from the 1992 Air Force MEAFFS (stock number 8415-01-351-0324) survey of 476 male and 71 female aircrew, as well as the data from the 1995 Navy MEAFFS survey of 89 female aircrew was used.

Demographic Questions: None

Measurements Used: Reported Height, Reported Weight, Acromial Height, Biacromial Breadth, Cervicale Height, Chest Circumference, Crotch Length, Crotch Height, Hip Circumference Maximum, Crotch Height Adjusted, Hip Height, Shoulder Circumference, Total Sleeve Length, Stature, Upper Thigh Circumference, Waist Circumference Preferred, Waist Height Preferred, Waist Back Length, Waist Front Height

Data Status: Fit test data available for up to 50 subjects wearing different size flight suits.

Acknowledgements: This study was carried out under contract F41624-93-C-6001 with Armstrong Laboratory, Wright-Patterson Air Force Base, Ohio. Funding was provided by the Defense Women's Health Research Program. Several clothing specialists were involved in this project. The authors wish to thank Margaret Altenau and Deborah Klensch of Juman Systems Center for providing garment patterns and valuable instruction on pattern measurement and sizing system development. Holli Williams, Scena Proodian, and Colleen Swavely of the Naval Aircraft Warfare Center provided supportive data collaboration. Bruce Bradtmiller of Anthropology Research Project, Inc. was particularly helpful as our technical editor.

9. Human Integration Evaluation of Three Helmet Systems (I-NIGHTS Study) – As personal protective equipment becomes more complex, more sophisticated tests of fit and function must be designed to determine and assess the effects of interactions between the user and various elements of the equipment. Among the newest protective ensembles available on the market are helmets with built-in Night Vision Goggles (NVGs) or Helmet Mounted Displays (HMDs). A program called the Interim-Night Integrated Goggle and Head Tracking System (I-NIGHTS) was established to examine such helmets. Under this program, the Helmet Mounted Systems Technology (HMST) Program Office undertook a series of fit and performance tests of three candidate systems manufactured by GEC Avionics, Kaiser Electronics, and Honeywell, Inc. This report

documents the fit, or human integration, evaluation designed to determine how well each helmet accommodated test subjects for comfort, stability, and optical placement.

Results: The results of the fit assessment indicate key areas of concern for the I-NIGHTS helmets.

- 1) GEC - For GEC the major concern is optical placement. The GEC method of liner preparation and helmet placement may play a role in this. Because helmet placement is critical to optical placement and therefore, optical performance, GEC may wish to reconsider its current method of liner preparation in order to improve the optical placement results. The GEC helmet was praised for the strap adjustments on the ear cups and at the nape of the neck. These adjustment methods were considered superior by many of the test subjects. Several of the subjects commented that GEC should add combiner stowing capabilities to their helmet.
- 2) Honeywell - The data for the Honeywell helmet indicate that the main area of concern was stability. Test subject comments were that the helmet was "too loose front to back, but too tight side to side" as well as the occurrence of numerous hot spots around the ear and on the side of the head indicate that Honeywell might want to consider some redesign of the shape of its helmet. The Honeywell optics provided excellent visual clarity when the optical system was inactive. The level of visual clarity diminished somewhat when the system was activated because of helmet instability, but overall the quality of the optics was considered good.
- 3) Kaiser - The Kaiser helmet data show frequent and extreme instances of instability. Comments from the test subjects (Appendix D in report) reveal that the weight of the helmet is not well distributed. Many of the subjects further complained that the helmet felt heavy due to poor weight distribution. Poor weight distribution may also be a factor contributing to the instability of the helmet. Kaiser might be well advised to examine this problem and consider whether redistributing the weight of the helmet would improve the stability of the system as a whole. The optical adjustment system of the Kaiser helmet was considered outstanding by the test subjects. They were particularly impressed with the flip-up method of stowing the combiners. Considered equally impressive was the level of visual clarity in the Kaiser optical system.

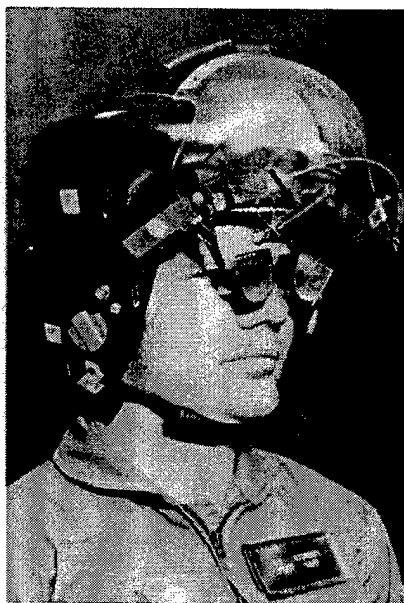
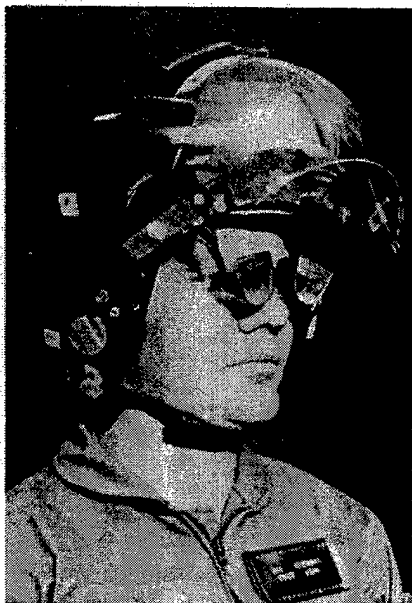
Sample Size: A total of 37 test subjects participated in the fit assessment. Those subjects can be grouped as follows:

- Twelve test subjects (two rated and ten none-rated) from the Combined Stress Branch of the Biodynamics/Bioengineering Division, scheduled for performance testing in the centrifuge.
- Twelve non-rated test subjects from the Escape and Impact Protection Branch, formerly the Crew Protection Branch of the Biodynamics/Bioengineering Division, scheduled for performance testing on the drop tower.
- Thirteen pilots from Ellsworth AFB, SD, Moffett Field, CA, and Hurlburt Field, FL scheduled for in-flight performance testing.

Demographic Questions: Standard Demographic Questions(*), as well as, Rated or Non-Rated, Military or Civilian, Wearer/Non-Wearer of Glasses, Hair Length, and Adjustment/Stability Questions regarding the helmet.

Measurements Taken Without Cap: Pupil to Top of Head, Tragon to Top of Head, Head Circumference, Head Length, Head Breadth

Measurements Taken With Cap: Pupil to Top of Head, Tragon to Top of Head, Head Circumference, Coronal Arc, Minimum Frontal Arc, Subnasale Arc, Menton Arc, Submandibular Arc, Head Length, Hed Breadth, Face Breadth, Bigonial Breadth, Face Length, Nose Breadth, Ear Length, Ear Breadth, IPD



Data Status: Over 200 three-dimensional scans of 37 subjects wearing different helmets available. A few scans have color files associated with them.

Acknowledgements: This study was carried out under contract F33615-89-C-0572 with Armstrong Laboratory Wright-Patterson Air Force Base, Ohio. Funding and test support for the effort was provided by the Helmet Mounted Systems Technology Program Office. Program managers were Captain Kevin Cooper and Mr. P. Scott Hall. Mr. James Stiffler of Ball Systems Engineering Division provided invaluable assistance in coordinating the various tests, and lent his expertise to the fitting of the helmet liners. The authors are also grateful to Mr. Ronald Yates From the Human Engineering Division of Armstrong Laboratory who ably assisted in the fitting of the helmets and the liners, to Mr. Jennifer Whitestone from the Human Engineering Division of Armstrong Laboratory, for her assistance in the planning and execution of the 3-D helmet scanning, and to Captain John Crist from the Human Engineering Division of Armstrong Laboratory, and Mr. Joseph Riegler of Logicon Technical Services, Inc. Ms. Mary Gross of Beecher Research Company and Ms. Joyce Robinson of Systems Research Laboratory assisted with the statistics. Thanks go also to Ms. Ilse Tebbetts of Anthropology Research Project who

served as technical editor, and to Ms. Jennifer Schinhofen, who assisted in the production of this report.

10. JSLIST Fit-Test Procedures – The purpose of this fit-test was to verify the number, and proportioning of the prototype sizes as well as to develop size selection charts and purchasing tariffs for four chemical protective (CP) suits: 1) an undergarment (UG), 2) an overgarment (OG), 3) a duty uniform (DG), and 4) Army Aviation Overgarment (AA). This study was conducted by a joint-service team and requires careful coordination and documentation to ensure the test runs smoothly. This report documents the detailed procedures as determined during dry-run testing.

Results: Size selection charts were generated for the four garments: an undergarment (UG), an overgarment (OG), a duty uniform (DG), and Army Aviation Overgarment (AA)

Sample Size: Generally, subjects for a fit test are intended to represent some larger population, and they must be randomly selected. For this test a systematic stratified sample will be used. Three individuals will be selected from each of 11 stature and weight categories for each sex, for a total of 33 people of each sex. These categories were established based upon the bivariate distributions from several surveys. This sampling method is intended to indicate the anthropometric fit boundaries for the sizes available for the items. Once the boundaries of fit are established they can be applied to other anthropometric survey data already available to derive the information needed.

Demographic Questions: Standard Demographic Questions (*), as well as Branch of Service

Measurements Taken: Weight, Upper Thigh Circumference, Maximum Hip Circumference, Hip Height, Neck Circumference, Shoulder Circumference, Chest Circumference, Waist Circumference Preferred, Waist Back Length, Total Sleeve Length, Sleeve Outseam, Sleeve Inseam, Stature, Cervicale Height, Neck Height, Preferred Waist Height, Crotch Height, and Biacromial Breadth

Data Status: Contact the Navy Clothing and Textile Research Facility at Natick, Massachusetts for status.

Acknowledgements: This study was conducted as a joint effort of the United States Army, Navy, Air Force and Marine Corps. The authors thank the following people for their contributions to the effort. Mr. Ed Hennessy of the U.S. Army Natick Research, Development and Engineering Center assisted in the anthropometric measuring during the dry-run testing and provided editorial comments for both the measuring and fit evaluation portions of this report. Captain Ron Cilek of the U.S. Air Force Human Systems Center at Brooks AFB, TX participated in the dry-run testing as a fit evaluator and provided guidance as to the assessment of fit. MSgt Richard Dennis of the U.S. Air Force Human Systems Center at Brooks AFB, TX provided guidance as to the "concept of fit" definitions and test procedures. Capt John Crist of the U.S. Air Force Armstrong

Laboratory at Wright-Patterson AFB, OH and Ms. Mary Pohlenz of Sytronics, inc. assisted in the dry-run testing.

11. TH-67 Size Accommodation Report – If small or very large pilots cannot safely fly existing trainers, it may be pointless to allow them to enter Undergraduate Pilot Training. Currently, the Bell Jet Ranger (designated TH-67 by the US Army) is part of the training pipeline that all USAF Helicopter pilots must go through. For this reason it was necessary to assess the anthropometric accommodation of the TH-67 cockpit. Numerous different test subjects were used that closely represent the extremes of body sizes within the potential user population

Results: There are two accommodation problem areas in the TH-67: Overhead clearance for tall pilots, and Over the Nose vision for short pilots. We cannot recommend that USAF pilot candidates larger than the current USAF Sitting Height limit of 40 inches be allowed to fly this aircraft. To do so places them at increased risk of injury in case of crash. A Maximum Buttock-knee length of 27.9" is recommended (this is larger than the USF primary trainer). For small pilot candidates, the minimum values for Sitting Eye Height should be 30" until flight tests demonstrate that less vision over the nose is acceptable. Forward vision could be easily improved by replacing the vision blocking device on the right side glare shield with something that can be completely stowed. Based on the difficulty our experienced TH-67 pilot had, Minimum Comboleg should be 41.4". Arm reach to controls is not a problem with this aircraft.

Sample Size: This research was carried out using live subject trials N=~25, and then used multiple regression to provide the best estimate for a particular accommodation parameter

Demographic Questions: None

Measurements Taken Inside Cockpit:

- 1) Overhead Clearance
- 2) Rudder Pedal Operation
- 3) Internal and External Visual Field
- 4) Static Ejection Clearances of the Knee, Leg, and Torso with Cockpit Structures
- 5) Operational Leg Clearances with the Main Instrument Panel
- 6) Operational Leg Clearance with the Control Stick Motion Envelope (the pilot's ability to move the stick through its full range of travel)
- 7) Hand Reach to Controls

Data Status: Consent needed to view data. Data is available in Excel format.

Acknowledgements: None

(*)Standard Demographic Questions: Name, Rank, Age, D.O.B., Place of Birth, Date, Location, Race, Sex, AF Specialty Code, MAJCOM

REFERENCES

- Blackwell, Sherri; Robinette, Kathleen M.; Boehmer, Mark S.; Fleming, Scott M.; Kelly, Sara E.; Brill, Tina R.; Hoeferlin, David M.; Burnsides, Dennis B.; Daanen, Hein (2002), *Civilian American and European Surface Anthropometry Resource (CAESAR), Final Report Volume II: Descriptions*, Human Effectiveness Directorate, Crew Systems Interface Division, Wright-Patterson Air Force Base, Ohio AFRL-HE-WP-TR-2002-0173
- Burnsides, D.B., Boehmer, M. and Robinette, K.M. (2001) 3-D Landmark Detection and Identification in the CAESAR Project, in Proceedings of the Third International Conference on 3-D Digital Imaging and Modeling Conference, Quebec City, Canada , pp. 393-398, IEEE Computer Society, Los Alamitos, CA.
- Giles, E. and Elliot, O. (1962) Race Identification from Cranial Measurements. *Journal of Forensic Science*. Vol. 7 pp 147-157.
- Gordon, C.C., Churchill, T., Clauser, C.C., Bradtmiller, B., McConville, J.T., Tebbets, I., & Walker, R. (1989). *1987-1988 Anthropometric Survey of U.S. Army personnel: Summary statistics interim report* (NATICK/TR-89/027, AD A209 600). Natick, MA: US Army Natick Research, Development and Engineering Center.
- Harrison, Catherine R.; Robinette; Kathleen M. (2002), *CAESAR: Summary Statistics for the Adult Population (Ages 18-65) of the United States of America*, Human Effectiveness Directorate, Crew Systems Interface Division, Wright-Patterson Air Force Base, Ohio, AFRL-HE-WP-TR-2002-0170
- Krogman, W.M. and My Iscan (1986) *The Human Skeleton in Forensic Medicine*. Springfield Illinois, Charles Thomas.
- Microsoft Corporation (2002) *Microsoft Excel*.
- Roberts, D.F. (1978) *Human Adaptation to Heat*. Cumming, Menlo Park, California.
- Robinette, K.M. (2000) CAESAR Measures Up, in *Ergonomics in Design*, Vol. 8, No.3, pgs 17-23, Human Factors and Ergonomics Society, Santa Monica, CA.
- Robinette, K.M.; Daanen, H.; Paquet, E. (1999) The CAESAR Project: A 3-D Surface Anthropometry Survey in *Second International Conference on 3-D Digital Imaging and Modeling, 1999. Proceedings*. pp: 380 - 386 IEEE Catalog Number: PR00062, IEEE New Brunswick, NJ.
- Stata Corporation (2002) *Stata/SE 7.0 for Windows*. College Station, TX: Stata Corporation.
- Statsoft, Inc. (1998) *Statistica Software for Windows, Version 5*. Tulsa, OK: Statsoft, Inc.

Trotter, M.R. and Gleser C. (1952) Estimation of Stature from Long Bones of American Whites and Negroes. *American Journal of Physical Anthropology*, 10 pp 463-514.

Zehner, G.F., Meindl, R.S., and Hudson, J.A. (1993). *A Multivariate Anthropometric Method for Crew Stations Design: Abridged*, AL-TR-1992-0164, Armstrong Laboratory, Air Force Systems Command, Wright Patterson Air Force Base, OH

INDEX: ANTHROPOMETRIC MEASURES

Alternate name(s) in brackets. CAESAR name in all caps.

Measure No.	Name	Visual Index Page	Statistics Page
1	ACROMIAL HEIGHT, SITTING [Shoulder Height, Sitting]	46	56
84	ACROMIAL HEIGHT, SITTING (COMFORTABLE), LEFT	52	139
85	ACROMIAL HEIGHT, SITTING (COMFORTABLE), RIGHT	52	140
41	ACROMIAL HEIGHT, STANDING, LEFT [Shoulder Height]	49, 50	96
42	ACROMIAL HEIGHT, STANDING, RIGHT [Shoulder Height]	48, 50	97
43	ACROMION-RADIALE LENGTH, LEFT [Shoulder-Elbow Length]	49	98
44	ACROMION-RADIALE LENGTH, RIGHT [Shoulder-Elbow Length]	48	99
2	ANKLE CIRCUMFERENCE	47	57
45	ARM INSEAM, LEFT	50	100
46	ARM INSEAM, RIGHT	50	101
3	ARM LENGTH (SHOULDER-ELBOW)	45	58
4	ARM LENGTH (SHOULDER-WRIST)	45	59
5	ARM LENGTH (SPINE-WRIST)	45	60
6	ARMSCYE CIRCUMFERENCE (SCYE CIRCUMFERENCE OVER ACROMION)	43	61
47	AXILLA HEIGHT, LEFT	49, 50	102
48	AXILLA HEIGHT, RIGHT	48, 50	103
50	BI-CRISTALE BREADTH	50	105
86	BI-LATERAL FEMORAL EPICONDYLE BREADTH, SITTING (COMFORTABLE)	53	141
87	BI-LATERAL HUMERAL EPICONDYLE BREADTH, SITTING (COMFORTABLE)	53	142
51	BI-SPINOUS BREADTH	50	106
88	BI-TROCHANTERIC BREADTH, SITTING (COMFORTABLE)	53	143
54	BI-TROCHANTERIC BREADTH, STANDING	49	109
49	BIACROMIAL BREADTH [Shoulder (Biacromial) Breadth]	50	104
52	BIGONIAL BREADTH	51	107
53	BITRAGON BREADTH	51	108
7	BIZYGOMATIC BREADTH	47	62
29	Body Height [STATURE]	43	84
8	BUST/CHEST CIRCUMFERENCE [Chest Circumference]	45	63
9	BUST/CHEST CIRCUMFERENCE UNDER BUST	45	64
55	BUSTPOINT-BUSTPOINT BREADTH	49	110
10	Buttock-Knee Length [BUTTOCK-KNEE LENGTH, RIGHT]	46	65
10	BUTTOCK-KNEE LENGTH, RIGHT [Buttock-Knee Length]	46	65
89	BUTTOCK TO TROCHANTER LENGTH (COMFORTABLE)	54	144
56	CERVICALE HEIGHT	48, 49	111
8	Chest Circumference [BUST/CHEST CIRCUMFERENCE]	45	63
11	CHEST GIRTH (CHEST CIRCUMFERENCE AT SCYE)	45	66
57	CHEST HEIGHT	49	112
12	CROTCH HEIGHT	43	67
58	Elbow Height [ELBOW HEIGHT, STANDING, LEFT]	49	113

59	Elbow Height [ELBOW HEIGHT, STANDING, RIGHT]	48	114
13	Elbow Height, Sitting [ELBOW HEIGHT, SITTING, RIGHT]	46	68
90	ELBOW HEIGHT, SITTING (COMFORTABLE), LEFT	52	145
91	ELBOW HEIGHT, SITTING (COMFORTABLE), RIGHT	52	146
13	ELBOW HEIGHT, SITTING, RIGHT [Elbow Height, Sitting]	46	68
58	ELBOW HEIGHT, STANDING, LEFT [Elbow Height]	49	113
59	ELBOW HEIGHT, STANDING, RIGHT [Elbow Height]	48	114
14	Eye Height, Sitting [EYE HEIGHT, SITTING, RIGHT]	46	69
14	EYE HEIGHT, SITTING, RIGHT [Eye Height, Sitting]	46	69
15	FACE LENGTH (MENTON-SELLION LENGTH) [Face Length (Nasion-Menton)]	47	70
15	Face Length (Nasion-Menton) [FACE LENGTH (MENTON-SELLION LENGTH)]	47	70
92	FEMORAL EPICONDYLE, LATERAL, LEFT TO MALLEOLUS, LATERAL (COMFORTABLE), LEFT	52	147
93	FEMORAL EPICONDYLE, LATERAL, RIGHT TO MALLEOLUS, LATERAL (COMFORTABLE), RIGHT	52	148
60	Foot Breadth [FOOT BREADTH, LEFT]	51	115
61	Foot Breadth [FOOT BREADTH, RIGHT]	51	116
60	FOOT BREADTH, LEFT [Foot Breadth]	51	115
61	FOOT BREADTH, RIGHT [Foot Breadth]	51	116
16	Foot Length [FOOT LENGTH, RIGHT]	47	71
16	FOOT LENGTH, RIGHT [Foot Length]	47	71
17	HAND CIRCUMFERENCE, RIGHT	47	72
18	Hand Length [HAND LENGTH, RIGHT]	47	73
18	HAND LENGTH, RIGHT [Hand Length]	47	73
19	HEAD BREADTH	47	74
20	HEAD CIRCUMFERENCE	47	75
21	HEAD LENGTH	47	76
22	HIP BREADTH, SITTING	46	77
23	HIP CIRCUMFERENCE, MAXIMUM	43	78
24	HIP CIRCUMFERENCE, MAXIMUM, HEIGHT	41	79
94	INFRAORBITALE HEIGHT, SITTING (COMFORTABLE), LEFT	53	149
95	INFRAORBITALE HEIGHT, SITTING (COMFORTABLE), RIGHT	53	150
62	INFRAORBITALE HEIGHT, STANDING, LEFT	50	117
63	INFRAORBITALE HEIGHT, STANDING, RIGHT	50	118
64	INTER-PUPILLARY DISTANCE	51	119
65	INTERSCYE DISTANCE	48	120
25	Knee Height [KNEE HEIGHT, SITTING, RIGHT]	46	80
25	KNEE HEIGHT, SITTING, RIGHT [Knee Height]	46	80
66	KNEE HEIGHT, STANDING, LEFT	48	121
67	KNEE HEIGHT, STANDING, RIGHT	48	122
68	MALLEOLUS HEIGHT, LATERAL, LEFT	49, 50	123
69	MALLEOLUS HEIGHT, LATERAL, RIGHT	48, 50	124
70	MALLEOLUS HEIGHT, MEDIAL, LEFT	51	125
71	MALLEOLUS HEIGHT, MEDIAL, RIGHT	51	126
26	NECK BASE CIRCUMFERENCE	45	81
72	NECK HEIGHT	51	127
73	RADIALE-STYLION LENGTH, LEFT	49	128
74	RADIALE-STYLION LENGTH, RIGHT	48	129

75	SELLION-SUPRAMENTON LENGTH	51	130
49	Shoulder (Biacromial) Breadth [BIACROMIAL BREADTH]	50	104
27	Shoulder (Bideltoïd) Breadth [SHOULDER BREADTH (BIDELTOID)]	45	82
27	SHOULDER BREADTH (BIDELTOID) [Shoulder (Bideltoïd) Breadth]	45	82
43	Shoulder-Elbow Length [ACROMION-RADIALE LENGTH, LEFT]	49	98
44	Shoulder-Elbow Length [ACROMION-RADIALE LENGTH, RIGHT]	48	99
41	Shoulder Height [ACROMIAL HEIGHT, STANDING, LEFT]	49, 50	96
42	Shoulder Height [ACROMIAL HEIGHT, STANDING, RIGHT]	48, 50	97
1	Shoulder Height, Sitting [ACROMIAL HEIGHT, SITTING]	46	56
28	SITTING HEIGHT [Sitting Height (Erect)]	46	83
28	Sitting Height (Erect) [SITTING HEIGHT]	46	83
76	SLEEVE OUTSEAM LENGTH, LEFT	49	131
77	SLEEVE OUTSEAM LENGTH, RIGHT	48	132
78	SPHYRION HEIGHT, LEFT	51	133
79	SPHYRION HEIGHT, RIGHT	51	134
29	STATURE [Body Height]	43	84
30	SUBSCAPULAR SKINFOLD, RIGHT	44	85
80	SUPRASTERNALE HEIGHT	49	135
31	THIGH CIRCUMFERENCE, MAXIMUM, RIGHT	45	86
32	THIGH CIRCUMFERENCE, MAXIMUM, SITTING, RIGHT	46	87
33	THUMB TIP REACH, RIGHT	43	88
34	TOTAL CROTCH LENGTH	43	89
35	TRICEPS SKINFOLD	44	90
81	TROCHANter HEIGHT, LEFT	49	136
82	TROCHANter HEIGHT, RIGHT	49	137
96	TROCHANter TO FEMORAL EPICONDYLE, LATERAL (COMFORTABLE), LEFT	52	151
97	TROCHANter TO FEMORAL EPICONDYLE, LATERAL (COMFORTABLE), RIGHT	52	152
98	TROCHANter TO SEATED SURFACE COMFORTABLE, LEFT	52	153
99	TROCHANter TO SEATED SURFACE COMFORTABLE, RIGHT	52	154
36	VERTICAL TRUNK CIRCUMFERENCE, RIGHT	43	91
83	WAIST BACK (CERVICALE TO WAIST) LENGTH	48	138
37	WAIST CIRCUMFERENCE, PREFERRED	45	92
38	WAIST FRONT LENGTH	43	93
39	WAIST HEIGHT, PREFERRED	43	94
40	WEIGHT (MASS)	44	95